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USSR Report

MILITARY AFFAIRS

AVIATION AND COSMONAUTICS

No 12, DECEMBER 1986

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USSR REPORT
MILITARY AFFAIRS
AVIATION AND COSMONAUTICS

No 12, December 1986

Except where indicated otherwise in the table of contents the following is a complete translation of the Russian-language monthly journal AVIATSIYA I KOSMONAVTIKA published in Moscow.

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AF FIRST DEPUTY CIC GIVES PEP TALK FOR NEW TRAINING YEAR

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 12, Dec 86 (signed to press 31 Oct 86) pp 1-3

[Article by Col Gen Avn B. Korolkov, first deputy commander in chief of the Air Forces: "A New, Higher Qualitative Level to Combat Training"]

[Text] In aviation there is a term "rubezh vozvrata" [point of no return; mission-abort decision point]. It is usually specified when calculating long-distance flights, short of which an aircrew can return to its departure field or to an alternate field in case of occurrence of any circumstances hindering continuation of the mission. This is a safety measure which makes it possible to protect personnel and equipment, to find and correct problems which occur en route to the destination or objective.

No such point has been specified along the path of acceleration of our country's socioeconomic development mapped out by the 27th CPSU Congress. Nor can there be such a point, for there can be no return to the old way. The party's path lies only forward, toward the bright ideals of communism. This is the will of the entire Soviet people, and that which the party has prescribed should be and will be carried out. The historical experience of development of our socialist state convinces us of this.

Air Forces personnel are working hard and persistently on carrying out the tasks assigned by the party, standing shoulder to shoulder in the monolithic ranks of the Armed Forces, together with the entire Soviet people. A process of renewal is in progress in our society: societal relations are being improved, socialist democracy is being deepened, the activities of political and ideological institutions are being improved, and inertia, stagnation and conservatism, which impede our forward progress, are being overcome. But a great deal of hard work lies ahead of us in all domains of social, political, and economic affairs, requiring of each and every one of us a high degree of purposefulness, conscientiousness, and manifestation of all spiritual, intellectual and physical energies and resources.

As we enter the new training year, we involuntarily look back at the path we have traveled, in order to assess what has been accomplished and to draw lessons from errors and mistakes. In this past year, working according to the combat and political training plan and schedule, pilots and navigators,

engineers, technicians, and specialist personnel of supporting units and subunits sought out and adopted in a practical manner improved forms and methods of organizing and conducting combat training. Excellent performance results have been achieved by those outfits whose personnel are distinguished by esprit de corps, a profound understanding of unity of aims and tasks, and who endeavor to perform each and every training activity and every training flight with maximum effectiveness. This has become possible because within the system of daily training and instruction, combat training is defined by its essential function. It was carefully planned and scheduled, well organized, and carried out on a proper methodological level.

Commencement of the training year in Air Force units was preceded by painstaking work by commanders, staffs, and political agencies involving planning and scheduling the training and indoctrination process in conformity with assigned tasks, determining ways and methods of accomplishing them, and communicating plans to executing personnel. During this period personnel upgraded, replaced and refurbished training facilities, refreshed and added to their knowledge of theory, in order to proceed with working on the new tasks fully armed with knowledge and skills.

Training commenced in the most highly organized fashion in the units and subunits in which officers A. Labkovskiy, N. Tonkushin, N. Dudarevich, M. Bicheyev, and many others serve. We should note that the intensity and pace of preparations for the new training year did not slacken for a single day, and the methodological and material prerequisites for future success were laid down in the course of daily routine work activities. Leader personnel were clearly cognizant of the fact that the tasks for the new year are not some kind of totally unexplored territory, where it would be necessary to begin everything from the ground up, but rather a logical continuation of an unbroken combat training process, taking into account what has been achieved in the preceding year as well as newly stated requirements. In other words, this is the next phase in improving the level of professional skill of flight personnel, engineers, technicians, and maintenance specialist personnel as well as organization and combat readiness of military collectives.

This past year -- the year of the 27th CPSU Congress -- was characterized by the fact that, just as throughout the country, a process of restructuring was begun in Air Force units, and an active search for new work techniques and methods was in progress. Restructuring proceeded in two basic directions: the most objective criteria were selected for evaluating experience in combat training amassed in recent years, and an organizational-methodological foundation was laid down for implementing a new approach to resolving the problems facing the Air Forces. A great deal of work has been done, and all within the span of a single year.

The following question might arise: why did all this suddenly come to pass, and are things not being done in too hasty a manner? We can answer this question as follows: the need for changes grew to a head over the last 10 years. And since the problems facing Air Force collectives as a whole are of a combined nature and are not resolved separately and independently, they should be overcome in a close linkage one with the other, on a solid material and organizational-methodological foundation. In addition, there is no leeway

for slip-ups. Here as well acceleration is a powerful means providing the capability to mobilize all moral and creative resources, for the meaning and purpose of restructuring is to eradicate those factors which engender deficiencies in military life and activities, which impede intensification of the training process and diminish the quality of combat training. The most important thing here is to restructure people's psychology, to awaken in them awareness of the fact that all this is a vital necessity, that people need this first and foremost, that inspired productive labor selflessly rendered for the benefit of society elevates man and makes our country powerful. It is very important that everybody -- both supervisor and executing personnel -- realize this fact.

The process of restructuring in people's consciousness and psychology as well as the results of this process are clearly manifested in their deeds and actions, in their work style and leadership methods, and in their ability to look to the future, correctly to determine the scope of their work and to approach the solving of problems which arise in an innovative manner. Such an important job-related quality as follow-through also takes on a totally different significance here.

It is no secret that over the course of many years the directive-volitional method has become firmly established in directing combat and political training in the line units, a method grounded on the conviction that it is more apparent to higher authority what should be done at a lower echelon and how it should be done. In connection with this principle, lower echelons would be brought harshly to account for an attempt to change something, even in trivial matters. Many supervisor personnel, in whom the concept of "efficiency and follow-through" is embodied only in conscientious, blind execution of the decisions of others, went through their developmental years in conditions of stifling of initiative and independence. The directive method did not permit analysis of these decisions and therefore on the one hand took away from command personnel initiative and the opportunity to carry out assigned tasks innovatively and with a minimum expenditure of energy and resources, sometimes prompting unwarranted and irresponsible actions, and on the other hand fostered a tendency on the part of some leader personnel to become convinced of their own infallibility.

Such phenomena as passivity and complacency, sluggishness of thinking and unimaginative routine, lack of initiative and a desire to achieve easy success for the sake of show, as well as deception, oversimplification, and pridefulness began to develop on this soil. All this reflected adversely on the main goal for the sake of which the complex mechanism of combat training has been organized in the military -- readiness and preparedness by a subunit immediately to engage in combat and successfully to wage combat in the dynamic and complex environment of modern war. For example, there is no possible explanation for officer Yu. Syshchikov's decision to do all combat flying exclusively at medium altitudes. The crews under his command kept to the medium altitudes for an extended period of time and performed combat drills according to a simplified scheme to the detriment of other, more complex training missions. But when the time came fully to display their skill, they had difficulty accomplishing missions of medium complexity.

We should note that officer Syshchikov's subordinates, who want very much to achieve a state of combat readiness, drew his attention to his errors of omission and did their best to eliminate unnecessary situation simplification in flight training, but they failed to achieve the desired results. Of course a commander is invested with considerable authority and in many regards can see the picture more clearly than those under him. But not always, and especially in those instances when a fog of an illusory satisfactory situation clouds over one's eyes, while active support by flatterers around a person lulls one's conscience. It is very difficult for such a commander to restructure himself, to change his style of leadership immediately. It is a good thing if he is able to look at his work and appraise his actions in a party-minded, high-principled, and self-critical manner. Otherwise the growing conflict with the demands of the time and the collective can have most undesirable results.

Discussion of restructuring, efficiency and follow-through at the beginning of the training year is no accident. Aviation units are faced with many problems, high-quality solution to which cannot be achieved with old methods. In the area under discussion, efficiency and follow-through signify from the standpoint of restructuring an ability innovatively to implement a directive document or the idea of a superior and to carry out a task at minimum cost but with substantial end results. Thus restructuring in the content and forms of combat training is simply inconceivable without independence, initiative, and innovativeness both on the part of leaders and executing personnel. Without these qualities, for example, it is impossible correctly to apply those organizational forms and methods decisions which have been tried, tested, and proven in the course of practical verification during this past training year. Without them it is impossible efficiently and purposefully to utilize on-duty time to accomplish the professional growth of aviation personnel taking into account their individual characteristics and individual proficiency level.

Of course it will be difficult for some superiors to agree that subordinates must be permitted to act as they see fit, since independence presumes not only that they are adequately trained but also confidence and oversight on the part of command personnel. This is a considerable burden, which is part of the obligations of anybody in a leadership position and toward which, unfortunately, not everybody has a conscientious attitude. In addition it will be necessary to reanalyze a great deal and to alter the form of one's conduct and management style. We must state frankly that this is a fairly painful process. Nevertheless nobody will be successful in an attempt to wait it through in the hopes that restructuring will not affect him, for it is a demand of the time, a demand of the party. We have now reached the point of aggressive action, and there is no alternative course of action.

Modern aircraft place very high demands on the knowledge and skills of the people who operate and maintain them. As MSU S. L. Sokolov, USSR minister of defense and nonvoting member of the CPSU Central Committee Politburo, notes, however, there is a considerable distance between assimilating theoretical knowledge and mastering the art of its practical application. The importance of this conclusion is confirmed by the practical experience of tactical air training. Only inability on the part of some commanders to think innovatively

and to make intelligent decisions can explain the fact that tactical air exercises at air bases where units are permanently stationed are conducted in a monotonous, predictable manner, following a thoroughly familiar pattern, without imagination and lacking unexpected elements of combat opposition. Such tactical air exercises are little instructive and virtually useless.

The Commander in Chief of the Air Forces demands that a serious effort be made to improve tactical air training, which determines the combat potential of combat aircrews and the combat readiness of subunits. Tactics should be improved in a regiment in which new aircraft and weapons are being mastered, that is, wherever there is a basis and opportunity for putting to the practical test new tactics and modes of combat employment. Today this is one of the most important tasks to be accomplished by aviation personnel in this coming combat year and on in the future.

As we know, that which is new is not always accepted immediately and unreservedly. Usually acceptance is impeded by obsolete views, somebody's "authoritative" but groundless opinions, complacency and disinclination to change the accustomed work rhythm. And although the process of renewal is irreversible, it needs the support of aggressive, searching individuals, people with creative abilities. Unquestionably the combat training leader-organizer should possess the gift of foresight, civic courage and boldness, a feeling of responsibility and, of course, should be disciplined, in order correctly to predict and assess the effectiveness of a new innovation. This means that any proposal or new conceptual idea, whether it involves equipment, tactics, flight training methods or organization of combat activities, must be thoroughly considered, calculated out and tested in the air.

Unit methods councils should state an authoritative word on this point. It is possible that effects will not be felt immediately and will be less than expected, but this should not impede enthusiastic innovative effort and people's striving toward finding new things and making improvements. On the contrary, an all-out effort should be made to foster initiative, mutual demandingness and integrity, discipline and a self-critical attitude, since only in such an atmosphere is a correct opinion formed and shaped, which helps find the correct solution. In this regard as well any tactical air exercise, regardless of scale, should contain an instructive tactical background, missions which are difficult but within the aircrews' level of proficiency, and should be of a research or investigative nature. It is important constantly to improve the criteria for assessing performance of exercises and drills and the overall proficiency of flight personnel.

A special role in this is played by range facilities, at which airmen hone their weapons skills. Unfortunately there are still a great many unresolved questions in organization of their work activities. Some commanders, for example, devote little attention to equipping ranges and fail to demand that the requisite target configuration be set up in advance. Range officers in turn, due to the insufficient demandingness of their superiors, are in no hurry to make changes, and display passivity and indifference to aircrew weapon training. This is also confirmed by the fact that survey of range targets is very sketchy and does not enable one correctly to evaluate the accuracy of delivery of weapons fire and bombs in accordance with current

standards. There still exist administrative and bureaucratic obstacles which hinder utilization of ranges which are situated close by but lie within other military districts. It is highly probable that the officers with jurisdiction over these facilities are guided primarily by narrow, parochial interests rather than national interest, which in no way fosters improvement in the combat proficiency of the defenders of the homeland and is at variance with the demands of restructuring. Obviously the appropriate interested officials should confer once and for all and reach a common solution, since all units are engaged in a single, common cause for our nation's Armed Forces -- increasing their combat readiness.

Training of young replacement personnel occupies an important place in combat training in the new year. The job performance of new graduates of military aviation schools from the very first days following their arrival in the line units depends in large measure on the conditions created for them for training, daily life and routine, both on and off duty. Experience indicates that wherever young officers are surrounded with care and attention and where experienced methods specialists are involved in their training and indoctrination, the breaking-in process is accomplished with precision and on schedule. Young people represent the regiment's future, and that future is determined by the purposefulness of the training and indoctrination process, in which active part is taken both by immediate superiors, political workers, party and Komsomol organizations. Fine traditions, meaningful comradely relations in the collective, organization and discipline, a sober way of life, and interesting off-duty activities create a good work atmosphere and help young airmen take their place in the regiment in a prompt and timely manner.

Unquestionably the commander sets the tone in military labor, training and work duties. The regiment is a large and complex operation, and the commanding officer has plenty to do. And his most important concern is achieving a high degree of combat readiness, which is expressed in the professional competence of flight and ground personnel. This is why flight operations and tactical air training take up the commanding officer's principal attention.

Col N. Loktev has proven to be a good organizer of the training and indoctrination process in the unit. He is a methodologically and tactically well-trained combat pilot, a disciplined, demanding and fair-minded superior, and an exceptionally decent individual. We should note that the regiment he heads is classified among the so-called difficult ones. This is expressed on the one hand in the fact that flight personnel vary in level of training, and this considerably complicates organization of flight operations, while on the other hand the geographic specifics of the unit's location exert considerable influence on the airmen's combat training and daily lives, both on and off duty. Nevertheless the commanding officer keeps a constant eye on all aspects of his men's activities. He is thoroughly familiar with the state of affairs in the subunits, teaches the squadron commanders to work independently, intervenes to set them straight only when this is extremely necessary, and always verifies the promptness and timeliness of execution of issued orders and instructions. He devotes a great deal of attention to provision of proper post facilities and amenities, ensuring that buildings on the base, including

quarters, are in proper condition and operating order, and devotes considerable attention to improving training facilities.

Airmen have a saying: show me how you formulate a task, and I will tell you how it will be carried out. There is profound meaning here. A commander's military and specialized knowledge, personal qualities and work style are evident precisely in how a commander assigns a task to his subordinates. Colonel Loktev assigns a task in a concise, clear, and concrete manner. Prior to making a decision, especially on contradictory or conflictive matters, he always confers with his deputies and ascertains their view on the matter. This helps him reach the most correct solution.

The regimental commander does not usurp the functions of the squadron commanders, but teaches them to work independently. At a tactical air exercise, for example, Maj A. Glukhov's subunit was to operate away from the base. At the squadron level, without intervention by regimental headquarters, they conscientiously prepared all the requisite documents for the flight and conducted navigation and tactical preparation and briefing of the aircrews, that is, everything was done as required. The squadron redeployed to another airfield in a prompt and timely manner and accomplished all tasks with excellent quality. A good deal of the credit for this must go to the regimental commander, who skillfully guided the squadron commander's actions during the period of daily training.

Training of instructors is one of the year's most important tasks. It is essential to direct all efforts toward ensuring that each and every flight commander flies in the capacity of instructor pilot and engages in direct instruction of his men. This is not a new item, but nevertheless it requires considerable support and attention by leader personnel. A shortage of instructor pilots delays the development of young combat pilots, and under no circumstances can this be tolerated.

The world today is enveloped in the threatening clouds of war. Unified imperialist forces, headed by the United States, have escalated the arms race in the aim of achieving superiority over the USSR and the socialist community, and in order to settle political disputes in their own favor in a military conflict. But these attempts are in vain. The wheel of history cannot be turned back. The world of socialism is further developing and growing stronger, and our glorious Armed Forces -- a reliable guarantor of peace and security -- stand in the defense of the productive labor of honest, upright people.

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WORLD WAR II COMBAT BY GROUND-ATTACK AIRCRAFT IN BUILT-UP AREA

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 12, Dec 86 (signed to press 31 Oct 86) p 4

[Article, published under the heading "They Flew to Win," by Hero of the Soviet Union Mar Avn I. Pstygo, honored military pilot USSR: "Ground-Attack Aircraft Fight in Built-Up Areas"]

[Text] In mid-September 1942 the enemy reached Stalingrad, drove a wedge into the defense at the boundary between the forces of the 62nd and 64th armies and, capturing a number of important hilltops, reached a point close to the downtown area. The line of contact twisted in serpentine fashion on a battle map. In some sectors the enemy was driving a wedge into our defenses, while in other sectors Soviet troops were to be found far to the rear of penetrating enemy forces. The units of Gen T. Khryukin's 8th Air Army were assigned missions to assist troops mounting counterthrusts and to provide close air support to units and combined units which were engaged within city limits, fighting for each block, each street, and each building.

Today it is difficult to picture the ferocity of the fighting. Fighters provided the troops overhead cover. Bombers hit those targets presenting the greatest threat. We flew ground-attack strikes, working in close coordination with infantry, artillery, and tanks, conducting combat operations close to the forward edge of the battle area, providing close support to ground troops. We were faced with a critical situation. We were short of aircraft, and aircrews were frequently working at the limit of their strength and ability.

One day in September our regimental commander, Maj F. Boldyrikhin, summoned me and the squadron's pilots to his command post.

"Enemy tanks have broken through to Saratovskaya and Kommunisticheskaya streets and have split our force apart," he informed them. "We have orders to find and destroy them. Comrade Pstygo, it is up to you and your squadron to accomplish this mission."

I had some combat experience by that time, but I had no idea how to go about finding and destroying such a small mobile target in a huge, burning city. But orders were orders.

I decided to start the search at the railway station, which was a good landmark. But how could we find the streets in question? You can't read street names from the air. And maybe they no longer even existed -- the city had been reduced to rubble.

Mission departure time was upon us, and we had not yet come up with a way to accomplish the mission. My wingmen, as I later ascertained, were also giving a good deal of thought to this. But what was my solution? The commanding officer is primarily responsible for successful accomplishment of a mission. I essentially determined the squadron's formation, mapped out possible maneuver in the target area, and detailed radio communications procedures as we went along.

We taxied out to the runway. But what was this? A staff car was racing down the runway right toward our revving aircraft. For some reason the thought struck me that this gross violation of airfield traffic procedures involved us, and so it did. The car came to a halt alongside my aircraft. Division chief of staff Lt Col P. Piterskikh climbed out, quickly clambered up to the cockpit and handed me a street map of Stalingrad.

"This red-penciled circle," he informed me, "is your target. Go get 'em."

We took off. By the time we were approaching the city I had fairly thoroughly studied the red circle on the map. But would we find tanks there? Wait and see. Calm and confidence gradually came to me. I boosted my pilots' spirits the best I could. They themselves had correctly guessed that Lieutenant Colonel Piterskikh had come for the purpose of giving us a specific mission.

Although the tension had eased off somewhat, we could not afford to relax our vigilance. The most important thing lay ahead. We located the designated streets. The enemy was playing it clever: the tanks were standing in the shadow of half-demolished buildings. We counted more than 10 of them, but there was no time to make an accurate count. In combat one must focus attention on hitting the enemy with maximum precision and effect.

I quickly and concisely radioed to my pilots everything I had noticed on the ground. I marked the target's location with a bomb burst. My pilots saw the burst and knew what to do. There were no enemy fighters in the area. Apparently hostile antiaircraft artillery had not yet had time to move up behind the penetrating tanks.

Setting up in a continuous-orbit or "Lufbery"-circle pattern, which made it possible fully to utilize a ground-attack aircraft's entire firepower, we attacked the tanks sequentially, one aircraft at a time, alternating between bombs and armor-piercing rocket projectiles, from a diving approach.

We would pull out of our dive practically at 3 to 5 meters above the demolished buildings. My pilots went into it with real enthusiasm. To make sure that nobody was too late in initiating dive recovery, I was forced to warn my men by radio. We were truly engaged in house-to-house fighting, engaging tanks in a built-up area. Henceforth we called this kind of fighting

"ulichnyy boy shturmovikov" [combat by ground-attack aircraft in a built-up area].

We set one tank ablaze, a second, and then a third.... We were informed by radio from the ground: "You're hitting them good.... Fly another pass, another one...." The surviving enemy armored vehicles proceeded to turn tail and run, taking cover under smoke from fires. Figures were running back and forth among them. They were either infantrymen of the tank-led assault force or crewmen from burning tanks. What was the difference? They were enemy. We went in low and proceeded to strafe the retreating fascists at point-blank range with cannon and machinegun fire.

We flew eight passes, expending all our bombs, armor-piercing rockets, and most of our cannon ammo. We accomplished the mission without any losses.

The regimental commander was waiting for us at the airfield. I proceeded to report: "Comrade Major! Senior Lieutenant Pstygo...."

"As you were!" the commanding officer barked rather sharply.

What was wrong? I looked myself over, adjusted my uniform, and once again began my report. But Boldyrikhin again interrupted me: "Ivan Ivanovich, you are now a captain!"

We later learned that as we were returning from our combat mission, Gen T. Khryukin, commanding general of the 8th Air Army, summoned Col M. Gorlachenko, our division commander, to the telegraph terminal and briefly informed him that the element had done an excellent job and that element leader Senior Lieutenant Pstygo was being given an early promotion to the rank of captain.

A regimental formation was held the following day. Major Boldyrikhin read the commanding general's citation and informed the men that the pilots of the strike element were to be awarded combat decorations. He then read to the men a telegram received from the Military Council of the 62nd Army: "The officers, men, and Military Council of this army are delighted with the performance of the ground-attack strike element. Their bold and skilled actions greatly assisted our troops in the built-up area combat in Stalingrad. Chuykov, Gurov."

Subsequently my comrades and I had repeated occasion to fly ground-attack strikes on enemy forces in built-up areas. But the fighting at Stalingrad was the most difficult, for at that time we lacked combat experience in these conditions.

...Recently, as I was going through my files, I came across that very street map of Stalingrad with the red circle marking Saratovskaya and Kommunisticheskaya streets. This priceless memento brought back memories of my fighting experiences and the heroic days of the defense of Stalingrad.

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COSMONAUT SOLOVYEV CONDEMS SDI IN INTERVIEW

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 12, Dec 86 (signed to press 31 Oct 86) p 5

[Interview, published under the heading "Pertinent Interview," with twice Hero of the Soviet Union Pilot-Cosmonaut USSR V. Solovyev, by editors of AVIATSIYA I KOSMONAVTIKA: "What Is Your Opinion About Reykjavik"; text prepared by Col V. Gorkov; first paragraph is AVIATSIYA I KOSMONAVTIKA introduction]

[Text] Twice Hero of the Soviet Union Pilot-Cosmonaut USSR V. Solovyev, who recently returned from Budapest, where he attended a congress of the Association of Participants of Space Flights, replies to questions submitted by the editors.

[Question] Vladimir Alekseyevich, the October meeting of Soviet and U.S. leaders in Reykjavik was an important event of 1986. What do those who attended the congress have to say about the results of this meeting?

[Answer] Everybody at the congress was in front of a television set on the evening of 12 October. We were watching a press conference with Comrade M. S. Gorbachev, and the U.S. astronauts were viewing a news report from Reykjavik. A frank, meaningful discussion had taken place at the congress on the preceding day, and everybody had high hopes that the meeting between the two leaders would generate some progress in relations between our two countries, for each and every one of us had seen with our own eyes how small and defenseless the Earth is. Our hopes were not destined to be realized, however. I had the impression that the astronauts were quite disheartened. Even in this disheartening atmosphere, the business of the congress went on. I consider it a great success that we were able to overcome feelings of disappointment and alienation and were able to reach certain decisions. In particular, an agreement was reached to form national committees of the association in countries with five or more cosmonauts, to engage in more extensive exchange of information, mutual trips to our countries with the opportunity to speak at scientific and technical centers, institutes, before the public, and an agreement was reached on publication of books. Today, when the world is literally in a state of seethe, one can state about the results of the Reykjavik meeting that it became a starting point for new thinking about the most critical problems of the present day. The Soviet Union launched the first artificial Earth satellite, opening up the space age. It

has now proposed something more substantial. Soviet peace initiatives offer the opportunity to put an end to distrust and to preserve civilization on our planet.

[Question] You are one of only a few individuals who combine the profession of cosmonaut and specialist in the field of space technology. What is your opinion on the concept of SDI? And a second question. Some Western observers claim that development of more sophisticated weaponry leads to stability in the world. Is this true?

[Answer] I consider the SDI concept to be fundamentally flawed. Aimed at undermining the economy of the USSR, it seems to me that it will boomerang primarily against the American people. As we know, there is an antidote to any poison. If the United States does in fact succeed in developing something like they are presently discussing, this will not occur tomorrow, nor next year, nor even 5 years hence. And according to current estimates an antidote costs only 10-15 percent of the SDI program. It is also fruitless from a military point of view. As a technical specialist, I am firmly convinced that a space "shield" looks good only on paper. What an invulnerable weapon the tank seemed to be to our grandfathers! But a closer examination revealed that it can be set ablaze by a Molotov cocktail. It is not my intention to draw an analogy here. But I have faith in the abilities of the people of our country. And our people remember well words which have proven true over the ages: "He who comes to us with the sword will perish by the sword." I would also call blasphemy support of the concept of SDI from the standpoint of development of technology. Professors Feoktistov and O'Neil presented very interesting papers at our congress. They proposed projects realization of which would produce a much greater technological leap forward than that claimed by the ideologues of SDI. Also noteworthy in this regard is a conversation I had with American youth astronauts at Mission Control Center on 21 October. "Do space colonies, Moon bases, or flights to the stars seem fantasy to you?" they were asked. "No," replied one of the American schoolchildren. "All this is technologically possible. What seems fantasy to us is the probability of encountering other intelligent beings, belonging to another civilization. This most likely will never happen, although one would very much like to believe it could." This is how children assess our possibilities. Note that in dreaming about the future, the children desire new contacts and acquaintances. It is hardly likely that they will take place, however, with SDI. I am deeply convinced that the space program can be developed in any peaceful direction, and it will produce many more dividends for the advance of technology than SDI. Why does our country oppose SDI? Because this is a program not of peace but of war. The Soviet people have suffered too much from wars; the last war brought them too much grief and sorrow. As for the second question, it is quite obvious: it is to some people's advantage to interpret things in their own way, for the theory still continues to persist that nuclear weapons are beneficial, because their existence allegedly eliminates the possibility of war. But quite genuine plans for U.S. attack on the USSR were drawn up when nuclear weapons were in the operational arsenal. And it was only response measures in the area of arms development which held the "hawks" in check. Anybody with the slightest degree of technical knowledgeability can comprehend that he who is higher, faster, and more

powerful can attack. Improvement of weaponry leads to the temptation to use it. So how can one talk about stability?

[Question] Vladimir Alekseyevich, what are the role and capabilities of astronauts in development of the SDI program?

[Answer] In principle SDI is viewed as a completely automated system. Astronaut participation in this program is not ruled out, however. The fact is that development and laboratory testing of virtually any equipment is followed by field testing. Nor will equipment for the SDI program be an exception. And space is the proving ground for this hardware. For this reason astronauts could play a substantial role in this. Whether they will do this voluntarily is another question altogether. I believe that before consenting to do so, a self-respecting astronaut will certainly give some thought to that which was perpetrated by his fellow countrymen who dropped the atomic bombs on Hiroshima and Nagasaki.

[Question] You spent a year in space together with Leonid Denisovich Kizim. From the vantage point of flight in orbit, what in your view are mankind's most urgent problems?

[Answer] I would say that it is by no means necessary to be in space in order to talk about urgent problems. Any intelligent person today is interested primarily by the question of whether he will survive or perish. When the Danish Communists invited me to attend their newspaper's celebration festivities, I was asked: "Can Copenhagen be destroyed from space?" We have passed over that city a thousand times. It is as distinct as the palm of your hand. But what does it mean to destroy a city? What kind of an act would this be? It is the same as gunning down a defenseless person. I told the Danes of the horrors of war we observe from orbit. It is a frightful spectacle! We saw tankers aflame in the Persian Gulf, oil storage tanks burning at Baalbek in Lebanon, and we viewed night fighting on the Iran-Iraq border. It is a most unpleasant feeling to see the Earth burning. As for other problems, I would place weather forecasting at the top of the list. Cosmonauts can make a contribution toward solving this problem. I read in a book that if the weather were accurately forecast even for just the current day in every area and region, this would result in a total savings of 1 billion dollars. I was astounded by that figure. But even a small improvement in accuracy of weather forecasting would greatly contribute to solving the problem of providing the people of this planet with food. Cosmonauts can also help in geological exploration and in the area of agriculture. The most important thing, however, is that the main problem -- the problem of war and peace -- must be resolved.

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IMPORTANCE OF REALISM, FULL EFFORT IN TACTICAL AIR EXERCISES

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 12, Dec 86 (signed to press 31 Oct 86) pp 6-7

[Article, published under the heading "For a High Degree of Combat Readiness," by Maj A. Zhilin: "But What Is the Consequence of Compromise With Realism?"; first paragraph is AVIATSIYA I KOSMONAVTIKA introduction]

[Text] A new training year has commenced in aviation units. The end results of airmen's labor depend in large measure on how efficiently training is conducted during the initial months. The experience of this past year convinces one that instances of excessive attention to form with consequent detriment to content as well as unnecessary situation simplification in combat training have not yet been eradicated in all subunits. These negative phenomena impede the advance of military collectives toward the heights of military expertise, and therefore it is necessary resolutely to combat them. There can be no compromise in this.

The tactical air exercise came to an end. The airmen returned to their regular training routine. After a few days nobody in the squadron even mentioned the dynamic intensity of the recent tactical air exercise. It was as if it had never taken place, as if the performance successes and failures which attended it had never happened. The experience they had gained was ignored, forgotten in the bustle of daily activities.

Unfortunately this situation is still sometimes encountered, in spite of the fact that in recent years the pace of training and of our entire daily lives has been increasing and that one can scarcely count on additional success without taking amassed experience into account. Observations indicate that some people still harbor the view that a past exercise is nothing but one more routine activity in the system of subunit combat training. But is that true? It has long since been known that any exercise, if it is correctly organized and efficiently executed, provides the opportunity not only objectively to determine the preparedness of aircrews to conduct combat operations and provides the commanding officer, flight personnel, engineer and technician personnel with skills in organizing, managing, and supporting combat activities but also serves as a basic foundation for achieving new heights of performance skill. But this will happen only if amassed experience is fully utilized.

What is it that sometimes impedes efforts to boost the efficiency factor of a tactical air exercise? First and foremost it is an excessive attention to form with consequent detriment to content, unnecessary situation simplification, and various compromises with realism. It is not so easy to eliminate them, and particularly because a certain tendency toward overcautiousness, established over the course of many years, impedes the process. In order to avoid taking bruises, it is better to play it safe, to simplify things here and to limit oneself there. The total logged flying hours target will be met -- that is the main thing! Such an approach to things is nothing but lip service and deception. Unfortunately, however, weighty justification is found for such an approach -- concern for flight safety.

I have seen initiative-lacking commanding officers use the term "flight safety" as protective armor behind which one can when necessary take refuge and avoid addressing the complex issues of combat training.

And yet the experience of commanders who are distinguished by an innovative approach to things convinces one that it is possible to get rid of deep-rooted unimaginative and predictable routine in decisions and actions, and fairly successfully at that, without taking one step beyond the bounds of flight safety. For example, in the subunit in which Military Pilot 1st Class Maj N. Simenko serves, the majority of exercises in fact are conducted in an environment maximally approximating actual combat. The airmen operate in conditions which demand innovative decisions of them, and this fosters their more rapid self-improvement. Many aircrews deliver strikes on mobile and small targets located in unfamiliar areas, successfully accomplish far-out intercepts of highly-maneuverable targets elaborately protected by jamming, and penetrate a well-organized air defense system. And the more complicated the combat environment, the more acute the feeling of responsibility on the part of pilots, engineers, and technicians for their actions and for the end result of their labor.

At the most recent tactical air exercise young combat pilots, such as Sr Lt I. Lunik, did a fine job alongside the veterans. He was assigned the mission to knock out ground targets located at tactical depth in the "enemy's" defense. Skillfully employing a variable flight configuration and maneuver to evade antiaircraft defense, the pilot reached the target search area undetected. Target detection was made difficult by the wooded, hilly terrain as well as careful concealment and camouflage. Nevertheless Lunik succeeded in spotting the missile launchers by barely discernible telltale signs, and was able to knock them out without the need to swing around and set himself up for a run on the target.

A question arises: why did the squadron commander assign a critical mission to a younger pilot rather than to an experienced combat pilot as is done in some subunits? Because he was concerned primarily not with his own personal tranquility but rather with the development of Senior Lieutenant Lunik, to whom this mock combat sortie gave more than dozens of other training flights. It made him more confident in his ability, he could sense his superior's confidence in him, and he endeavored to justify this confidence with honor.

The exercise constituted an important test of this officer's combat proficiency.

It is no secret, however, that in some units only first-rate, high-time aircrews are assigned, year after year, the most critical missions at tactical exercises. The younger pilots are held back out of concern that something might go wrong. A rating of 5 at a tactical air exercise obtained so easily pleases nobody except perhaps a commanding officer with a tendency toward overcautiousness. One should give some thought to the fact that a performance mark obtained in this manner does detriment not only to one's men but also to the cause of overall combat readiness. The adversary will be giving an objective performance mark in actual combat. Obviously more thought should be given to how this phony success jibes with the trust of a people which has placed its fate in our hands and has given us magnificent weapons to defend our country's skies.

I recall a noteworthy incident. During a tactical air exercise aircrews were successfully accomplishing assigned missions on the whole, but one pilot fouled up. His mistake seemed small against the overall rosy picture, but nevertheless it was a dark spot. Believing that this fly could spoil the ointment, the commanding officer decided to keep the incident hushed up. Of what "instructive" benefit was such an action? Any comment would be superfluous. One might ask, however, whether today, in conditions of breaking up obsolete views and a search for new approaches to accomplishing current tasks, can we accept such occurrences? Of course not. Failing to attach significance to poor-quality execution of a training sortie means in actual combat conditions giving the potential adversary an opportunity to deliver a counterstroke. And if we consider the destructive force of modern nuclear missile weapons, we can easily imagine the potential consequences.

Practical experience convinces us that any mistake connected with improving combat performance must be discussed openly, in a straightforward manner, bearing in mind that the bitter truth is better than a sweet lie. If a commander or pilot possesses a strong sense of responsibility for his actions, he treats every training sortie as an actual combat mission and prepares for it in a fully demanding manner.

Today the human factor is taking on particular significance in carrying out assigned tasks. Success or failure depends entirely on the human operator, with his ideological outlook and attitude toward the job at hand. Sluggishness and passivity on the part of certain individuals, however, presents a serious hindrance on the road to expertise. This can be corrected, but keen, aggressive indoctrination work with personnel is essential. This is that bow which touches the strings of a person's intellectual activity and impels one to devote one's entire energy and knowledge to the common cause.

Unfortunately there still exists a great deal of lip service in indoctrination work. Let us take, for example, the schedule of activities for a tactical air exercise as planned out by a squadron deputy commander for political affairs. It contains an extensive list of various activities, including rallies, discussions, meetings, and lectures. In short, the quantitative aspect is fine. But how about the qualitative aspect? This is a bit more complicated.

Most frequently measures of a general nature predominate in an activities schedule. And this is by no means mere happenstance. It is easier to organize and carry out such measures, and it makes a more impressive report. Personnel are ordered to assemble, they listen to speeches by "staff" speakers, and then go their various ways. Another fulfillment mark is placed in the plan. But what kind of a mark did this activity leave in the airmen's hearts and, more important, in the heart of each individual? Not much of a mark. What happens is there is a lot of talk and appeals, but little results. People sense this lip-service approach and an indifference toward response to the activist's appeals. And this engenders disappointment, apathy, and sluggishness.

A conclusion suggests itself: we must seek new means of acting upon people's consciousness, and we must more fully utilize existing work forms which have been practically tested and proven. How was it done during the years of the Great Patriotic War? Conviction on the part of Soviet fighting men in the righteousness of the cause for which they were fighting compelled them to charge pillboxes, fly burning aircraft into concentrations of enemy troops, to sacrifice the most precious thing -- their own life -- for the sake of the common victory. But what helped keep up their fighting spirit during those most difficult years? The unconcealed truth, honest words of appeal by the party, which were communicated to the men by party member-commanders and political workers as well as party activists. They also inspired the masses to great exploits of valor through their own personal example of a selfless attitude toward the cause. It is particularly important for people empowered to lead others to remember this.

I believe that the effectiveness of employed forms and methods of indoctrination depends first and foremost on how they are used. It is important constantly to study the situation, to know people's attitudes, to be current and up to date in all things. This will make it possible to select the requisite work method.

The wealth of experience in working with personnel amassed by those who have come before them is utilized in the squadron in which Military Pilot 1st Class Maj V. Semenko serves. Party and Komsomol meetings would be held here during the period of preparation for the next tactical air exercise. Routine activities, but one should see the manner in which they were conducted! Communists and Komsomol members spoke openly and self-critically about what was impeding them in their work and what had to be done in order better to accomplish assigned tasks. They would make frank assessments of shortcomings and deficiencies. They would specify ways to correct them. And they would do this in a committed, aggressive, businesslike manner. Analyzing statements by Communists and Komsomol members, the unit command authorities revised the previously drawn-up methods council work plan, and substantial emendations were made in the training and indoctrination process. Tangible effect was also produced by other measures conducted on the eve of and during the exercise. This helped successfully accomplish assigned tasks.

Unfortunately there are not too many such examples of a businesslike, party-minded, frank discussion followed not only by a resolution but by concrete actions. It is for this reason that they merit all-out support.

Let us return to the tactical air exercise, however. During the exercise principal attention was devoted to competition to meet performance standards and to publicizing people's experience and know-how, exemplary performance, and initiative. It is in large measure thanks to efforts by party activists officers V. Khrustalev, A. Bezhko, S. Lopatin, and I. Yarkov that competition was conducted on an extensive scale. Competing aviation personnel displayed mutual help and assistance as well as commitment to the common cause. When Sr Lt I. Krasnorudskiy had to change main-gear tires (a rather laborious process), he was helped by competition rival Capt F. Kravets. As a result Krasnorudskiy's aircraft was brought on-line without delay. Incidentally, the pilots also greatly assisted technician personnel at the exercise.

Party buro secretary Capt V. Khrustalev selected a party assignment for each party member. Party and Komsomol groups were set up in the services and crews away from their subunits, and party group organizers, Komsomol group organizers, agitators, and news bulletin leaflet editors were appointed and briefed.

...The mock combat came to an end. Preliminary exercise performance results were determined. The exercise had been a success. Things perhaps could have ended with this, but the airmen were in no hurry to file the experience away and forget it. They asked themselves the question when they should begin preparing for the next tactical air exercise and where was the line dividing daily training from immediate preparations for an exercise. And does such a boundary line in fact exist? Practical experience indicates that since a certain phase of training ends with a tactical air exercise, preparations begin somewhere toward the end of the training phase.

As we know, various drills are conducted with leader personnel in the process of immediate preparations for an exercise, documents are prepared at headquarters, and calculations are readied. At that same time lectures are presented to personnel, special training activities and brief tactical drills are conducted. Unresolved problems are hastily corrected during this period, while haste frequently gives rise to mistakes and leads to failure to observe proper training sequence, to stretching points, and to diminished quality. Thorough organization and a combined approach are essential in order to accomplish everything.

The following incident occurred in the squadron. In the course of a tactical air exercise Capt N. Buzuk was assigned the mission of knocking out an "enemy" strongpoint. He glibly reported that he was ready to carry out the mission. Maj V. Semenko, however, decided to check out his preparedness. It turned out that Captain Buzuk's flight chart was unprepared and that his calculations had been performed carelessly. The officer was not familiar with the specifics of the tactical environment at the range. One can easily imagine how the mission would have been accomplished if the squadron commander had not displayed prudence and foresight.

Military Pilot 1st Class Maj V. Semenko is convinced that the totaling up of performance results from the most recent exercise can serve as the beginning of preparations for the next one.

"It is precisely at this time," he says, "that we reveal our shortcomings and specify measures to correct them. Experience convinces us that combat missions are successfully accomplished whenever daily combat training takes place in a smooth, even manner, precisely according to schedule and without a rush-work effort. And experience amassed at the preceding exercise must be applied immediately, without interruption and without slipup."

A genuine combat pilot is distinguished by the ability to do an excellent job of flying, bombing, and shooting. It is precisely thanks to a virtuoso mastery of their equipment, excellent knowledge of the enemy's combat tactics, his strong and weak points, and skillful combination of fire and maneuver that the heroes of the last war gained convincing victories over an intelligent, well-armed opponent. Flying skills and the skill of maneuver were a means to achieve tactical superiority, while skill in employing one's weapons would bring an attack to its logical conclusion. But it is impossible to acquire outstanding warrior qualities in hothouse conditions, in an environment of unnecessary relaxation of demands and unnecessary situation simplification.

Intimately-blended flying, tactical, and weapons skills, profound knowledge of theory, moral staunchness, and profound conviction in the righteousness of our great cause -- building of a new, communist society -- this is the source of the invincibility of our fighting man. These qualities are developed in day-by-day training and are tested at exercises.

Thus a tactical air exercise is not simply a performance report pertaining to the ability to shoot, bomb, or fire missiles. It is a school of courage, tactical and flying skill, and preparedness successfully to carry out difficult missions in a realistic combat situation. It is therefore important to ensure that each and every tactical air exercise becomes a genuine test of airmen's combat performance.

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CASUAL ATTITUDE TOWARD AIR DEFENSE PENETRATION DURING TRAINING EXERCISES

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 12, Dec 86 (signed to press 31 Oct 86) pp 8-9

[Article, published under the heading "For a High Degree of Combat Readiness," by Maj M. Yuryev: "Without Unnecessary Relaxation of Demands and Situation Simplification"]

[Text] The tactical air exercise was in full swing. The situation was changing hour by hour. The "aggressor," having lost the initiative in battle, was hastily moving up reserves toward the "battle" line and preparing to launch an offensive. The bomber flight led by Military Pilot 1st Class Maj N. Artyukhin was assigned the mission to deliver airstrikes on ground targets at tactical depth in the "enemy's defense. It was not an easy mission. Complexity of its execution consisted first and foremost in the fact that the bomber crews had to penetrate a strong air defense.

The aircraft took off. At the command post the tactical control officers closely watched as the situation developed on the radar display, on which the strike-force bombers appeared as bright blips.

"They are adhering precisely to the designated route and maintaining precise distance between two-aircraft elements," one of the officers noted approvingly.

Several minutes later the nicely-formed string of blips on the screen proceeded to break up and scatter. This meant that the bombers had commenced maneuver to evade antiaircraft fire.

In another moment the pilots would be performing another task. It involved rapidly altering formation and arriving in the area of the range from different directions, at different altitudes, at a precisely specified time. This would give the aircrews a clear advantage and would enable them to approach the target undetected and deliver a devastating airstrike.

It was clearly apparent from the radar display that Maj N. Artyukhin's flight was approaching the calculated point of initiation of the bombing run. Everything was proceeding extremely well. Soon, however, a report was received by the command post from the range that only the first two-bomber

element had accomplished the bombing successfully. The second element had been unsuccessful.

What had happened? Analysis of the flight data recorder tapes helped determine the reason for the failure. Analysis made it possible to establish the following. The pilots of the second two-ship element, led by Capt Ya. Yavtyuk, had failed to maintain the prescribed bank angle and load factor parameters during execution of maneuver to evade antiaircraft fire. This lack of precision in flying technique led to another error. The element leader was late in determining his position, and as a result even a hard turn to the desired heading failed to correct the lateral deviation in flight path which had developed. Following the leader's actions, the wingman also erred.

A question arises in this connection: why was the element leader unable to maintain the specified maneuver parameters? It was ascertained during the post-mission analysis that he had failed to maintain clean piloting technique. As a result, a mistake by one pilot led to failure of the two-ship element to accomplish the mission and a diminished performance mark for the entire flight.

Penetration of air defense zones.... There are occasions when one hears some pilots say in a half-jesting manner that in daily routine training activities penetration of air defense zones is a mere formality. Unfortunately some commanders also hold such an opinion, and for this reason they do not require that their subordinates precisely execute maneuvers to evade antiaircraft fire. At times this element is performed in a highly unrealistic, lip-service manner. Hence the casual attitude toward it.

In peacetime one can get away with this, since there is no actual opposition by antiaircraft missile systems. But aircrews are not training for demonstration flights or flights for show, but for operations in actual combat. For this reason one is quite justified in asking whether this situation simplification is really so harmless in combat training. The experience of the Great Patriotic War provides an unequivocal reply to this question: one must prepare with a high degree of seriousness for an encounter with the enemy.

The situation is sometimes paradoxical. All pilots are aware of the fact that air defense penetration is one of the main elements of a mission, just as they are aware of the potential consequences of a pilot's carelessness in executing maneuver to evade antiaircraft fire in actual combat. This is a pilot's axiom, if one may state it in these terms. Nevertheless an environment maximally approximating actual combat is not always created during training sorties involving this type of aircrew tactical training, and the quality of combat maneuvering is not always evaluated in a frank and firm manner.

What is the reason for such a slighting attitude on the part of some aircrews toward acquiring the skills of effective penetration of an air defense zone? As we know, in preparing combat aircrews for a training sortie, time is allocated for study of various maneuvers to evade antiaircraft fire and fighter-evasion maneuvers and to practice maneuvers on the simulator. The tactical situation is marked on flight maps, the target approach route is laid

out taking into account the capabilities of air defense assets, and points of probable encounter of "hostile" fighter-interceptors are indicated.

It would seem that everything is being done properly. But the problem is that it is sometimes done just to go through the motions, so to speak, in case a superior checks one's mission documentation. As a result the training activity is considerably simplified, since it is emasculated of the main element -- the need to act as one would act in actual combat.

For example, commands received from the command post frequently restrict crews in execution of maneuvers, while the preselected flight level excludes the possibility of maneuvering in a vertical plane. In addition, the tactical situation on the map, routes of approach to the target, and maneuvers sometimes remain unchanged for long periods of time. This leads to a substantial loss in combat proficiency. Pilots develop a predictable routine in their actions, develop a fixed routine on the range and, most important, tactical thinking becomes dulled, as does the ability to gain one's bearings quickly and knowledgeably in today's fast-moving, complex, sometimes even contradictory combat environment.

As we know, all elements of a training sortie are graded on a four-point system. But execution of maneuvers to evade antiaircraft fire is rated on the basis of only two criteria: success or failure to penetrate air defense.

If one examines training sortie flight sheets, one can find for practically every pilot an entry indicating that all combat maneuver elements were executed with a mark of excellent. This means that the combat pilot skillfully penetrated a "hostile" air defense system and that his aircraft took no hits from antiaircraft weapons or fighters. Such stable performance results are a cause of great satisfaction. However, there is a small "but" here.

Think about it: can such results in fact be achieved, especially if we are talking about novice pilots who are just beginning work on mastering the combat training program? Analysis of flight data recorder tapes, checking of maneuver parameters, and a comparison of these parameters with standard figures indicate that marks are sometimes simply unwarrantedly overstated. One might ask whom we are trying to fool if not ourselves?

The experience amassed in vanguard units and subunits convinces us that training sorties flown in coordination with antiaircraft missile and fighter subunits provide good training for flight personnel in methods of penetrating "hostile" air defense zones. And this is quite logical, since it is precisely in specific one-on-one combat that one can truly test one's abilities and the level of one's combat skills.

Here is an instructive example. A group of crews were assigned the mission to hit a concentration of "enemy" tanks. The regimental commander provided all crews with conditions in which they were able independently to select the direction of run on the target and variations of air defense penetration. In addition, just prior to mission departure the pilots were warned that the "enemy" might employ fighter-interceptors on the far approaches to the target.

When it came time to hit the target, the flight led by Military Pilot 1st Class Capt A. Valkov placed bombs on the target on the first pass. The second flight then came in from a different direction, but ...accompanied by "hostile" fighters. This meant that the bombers were "destroyed" and failure to accomplish the mission.

How did it happen that, while operating under identical conditions, aircrews achieved different results? The fact is that the leader of the first flight, skillfully utilizing terrain irregularities and the position of the sun, succeeded in outfoxing the "enemy" and effectively accomplished his maneuver to evade antiaircraft fire. But the commander of the other flight proceeded with predictable, unimaginative routine. Failure quite logically ensued.

Unfortunately one can hear some commanding officers saying that it is complicated to arrange for training flights with actual "enemy" opposition. Is this true? Perhaps what we have here is more a disinclination to take on additional responsibility and assume the burden of organizing effort.

Combat training indicates that possibilities exist for such one-on-one combat. For example, training sorties by those same bombers, performing the function of performance-grading intercept targets for air-to-air combat training. Perhaps it would make sense to use them not for the sake of logging "excursion" time, following strictly-specified routes and altitudes, but rather for honing the combat pilots' tactical skills and somewhat broadening the airmen's capabilities in combat maneuvering, while strictly observing flight safety procedures.

During the Great Patriotic War Soviet bomber pilots frequently flew combat missions to destroy enemy personnel and equipment while at the same time fighting off attacks by enemy fighters. This mission was accomplished most successfully when aircrews did not restrict their freedom of maneuver but acted with initiative, in conformity with the developing situation.

Combat training results convince us that the flight commander plays an important role in improving the tactical skills of flight personnel. The first steps in innovative quest by combat pilots begin precisely here. Brief tactical drills are very helpful to the flight commander. They help more deeply reveal the essential substance of a given maneuver and make it possible to conduct an effective search for ways to improve flying skill. Diversified scenario instructions in the course of a brief tactical drill in the various phases of a training sortie help pilots develop innovative thinking and help them depart from unimaginative, predictable actions.

Just such an innovative atmosphere can be observed in the flight headed by Capt A. Valkov. This officer attaches special importance to tactical training and working on elements of combat maneuvering. An innovative approach to the study of tactics -- one of the basic subject areas for pilots -- has a positive effect on combat training. The flight's personnel have time and again displayed examples of initiative, boldness, and intelligent calculated risk in the course of tactical air exercises.

In my opinion those airmen who during the training process arrange to visit antiaircraft missile subunit command posts are absolutely correct. Unfortunately such get-togethers are organized very rarely. By possessing knowledge of the "kitchen" in which air defense systems detect air targets, pilots are able to devise effective countermeasures.

...The winter period of training has begun. Combat training is picking up the pace. In order to improve its organization, we must more resolutely combat unnecessary situation simplification and unnecessary departure from realism. Practical realities demand that each and every day of training be permeated with initiative and innovation.

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IMPORTANCE OF NEW, REVISED PARTY PROGRAM EXPLAINED

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[Article, published under the heading "27th CPSU Congress: Aspects of Theory and Practice," by Col F. Seyranyan, professor and doctor of historical sciences: "Fundamental Party Document"]

[Text] The CPSU Program is a most important party theoretical and political document, the foundation of the party's ideological unity. The Communist Party elaborates and formally articulates in its Program the strategy and tactics of the revolutionary science of winning. To use an apt expression by the founders of scientific communism, the Program is "an openly hoisted banner," by which the entire world judges the party. V. I. Lenin wrote in an article entitled "To the Village Poor" that the Program means a concise, clear and precise statement of everything the party is seeking to achieve and for what it is fighting.

Guided by the first Program, adopted in 1903 at the 2nd Congress of the Russian Social Democratic Workers' Party, the Bolshevik Party led the working people to the Great October Socialist Revolution, which opened up a new era -- an era of transition by mankind from capitalism to socialism.

The Second Party Program, adopted in 1919 at the 8th Congress of the Russian Communist Party (Bolshevik), theoretically and practically armed the Communist Party, the worker class, and all working people of the young Soviet Republic with a specific, scientifically substantiated plan for building socialism. This task, magnificent in scale and significance, was also accomplished in a very short period of time thanks to unprecedented labor enthusiasm on the part of Soviet citizens. Great economic, social, and political reforms were accomplished. Socialism, about which the finest intellects of mankind had dreamed in the past, became reality for the first time in history.

And soon after the Great Patriotic War, thanks to the heroic labor of the entire Soviet people, the USSR substantially strengthened its economic, scientific-technical and defense potential, and consolidated its international position. At its 21st Congress the party reached a conclusion that the total and final victory of socialism in our country was attained by the end of the 1950's.

Adopting a Third Program at the 22nd Congress in 1961, the CPSU set about to perform enormous work in all areas of building communism. As a result the country entered the stage of developed socialism. The Soviet Union now was playing a greater role as a mighty factor in the struggle against the imperialist policies of oppression, aggression, and war, in the struggle for peace, democracy, and social advance.

The time which has passed since adoption of the Third Program has confirmed the correctness of its basic theoretical and political points. At the same time amassed experience and scientific analysis of changes in this country's internal affairs and in the world arena have made it possible more precisely and specifically to define the future development prospects of the Soviet society, the ways and means of obtaining the ultimate goal -- communism -- and the tasks of international policy in new historical conditions.

The new, revised CPSU Program, adopted at the 27th CPSU Congress, is grounded on the firm foundation of Marxist-Leninist theory and constitutes a result of scientific synthesis of the historical experience of all generations of Communists, Soviet citizens, and the objective course of societal development. CPSU Central Committee General Secretary Comrade M. S. Gorbachev emphasized in the Central Committee Political Report to the 27th CPSU Congress: "In conformity with the Leninist principles of formulation of program documents and established traditions, the Program should present a detailed picture of the present world, the main trends and mechanisms of its development, and a clear and well-reasoned presentation of those goals which the party sets for itself and to the attainment of which it is calling upon the masses." In this party document the CPSU appears as a worthy successor to the ideas of socialist transformation of society advanced by the founders of scientific communism and a successor to the fine revolutionary traditions of the Russian and international proletariat.

The new, revised Party Program contains a detailed analysis of the processes taking place within our country and in the world arena and describes in detail the strategic areas and directions of work by the party. It is a document of communist humanitarianism and vivid evidence of the truly democratic nature of our party, of our socialist system, of optimism, confidence in tomorrow, unity and stability of the entire Soviet society, and it is a demonstration of the peaceful thrust of our goals and tasks.

This main party theoretical and political document presents a comprehensive Marxist-Leninist analysis of the basic directions and features of world development. It is not an aim of the Program to anticipate the future in the great diversity of its specific manifestations. It states: one can follow a correct, scientifically substantiated policy only if one clearly understands the key trends in world events. Its content is characterized by deep penetration into the dialectics of that which is taking place at the present stage of history, begun by the Great October Socialist Revolution, and by the ability to draw correct conclusions which reflect movement forward. One conclusion states: regardless of the nonuniformity, complexity, contradictory and conflictive elements, mankind's movement forward toward socialism and communism cannot be stopped.

Many points and conclusions are amplified and refined in the new, revised CPSU Program. For example, it contains a detailed description of the principal content of the contemporary era. "It is an era," reads the new, revised Party Program, "of transition from capitalism to socialism and communism, of historic competition between two world sociopolitical systems, an era of socialist and national liberation revolutions, of the collapse of colonialism, an era of struggle by the principal driving forces of societal development -- world socialism, the worker and communist movement, the peoples of liberated nations, and mass democratic movements -- against imperialism, its policy of aggression and oppression, a struggle for peace, democracy, and social advance."

This definition and every line in the Program of the Party of Lenin is permeated with unshakable faith in the triumph of communist ideals and is focused toward preventing war, consolidating world peace and the principles of peaceful coexistence of states with different social systems. An important trend in world development, reflected in the description of the contemporary era and the principal driving forces of the process of revolutionary transformations, is the growing role of mass democratic, antiwar movements in the campaign for peace and social advance, movements which, together with socialism, the worker and communist movement as well as the national liberation movement, comprise a growing potential for peace.

A description of a qualitatively new state of the Soviet society, which it will reach as a result of carrying out the Program, whereby the program goals extend beyond the end of the present century and exceed those stated in the Basic Directions of Economic and Social Development of the USSR for 1986-1990 and the Period up to the Year 2000, constitutes a major contribution to the theory of scientific communism.

The concept of acceleration, which finds expression in the new, revised CPSU Program, is truly a new word in the theory and practice of building communism. The party's strategy, it was noted at the congress, consists in accomplishing transition to an economy with a higher degree of organization and effectiveness, with comprehensively developed productive resources, mature socialist production relations, and a smoothly-functioning mechanism of economic management. These transformations will make it possible to build a solid material foundation for achieving the party's principal program goals -- rapid growth in the prosperity of the people and comprehensive development of the individual, as well as strengthening of our homeland's economic and defense might.

The new, revised CPSU Program states the principal tasks of party social policy. This policy is viewed as a powerful means of accelerating our country's development, boosting the labor and social activeness of the masses, forming the new man, and firmly establishing the socialist way of life as an important factor in the political stability of society. A distinctive feature of the social policy substantiated in the Program is its focus on resolving essentially all problems which determine people's working and living conditions.

Of fundamental significance are the program points dealing with development of the political system of the Soviet society. The strategy of this development lies in improving Soviet democracy and increasingly fuller implementation of socialist self-government by the people on the basis of active and effective participation by the working people, their collectives and organizations in resolving matters pertaining to governmental and societal affairs. The party -- the nucleus of the political system of Soviet society -- is the leading and guiding force of this process. Operating within the framework of the USSR Constitution, the CPSU guides and coordinates the work of governmental and public organizations and seeks to ensure that each such organization fully carries out its characteristic functions.

A key issue of party policy is the development and strengthening of the Soviet Socialist State and increasingly fuller unfolding of its democratic, truly popular character. The CPSU views defense of the socialist homeland, strengthening of our country's defense and ensuring national security as one of the most important functions of our popular state.

Our party and state hold that the greatest guarantees of security in the face of the U.S. and NATO militarist challenge lie today in the capability of socialism to maintain military-strategic parity. Its establishment is assessed in the CPSU Program as a historic achievement of socialism. The interests of ensuring the reliable defense of socialism require that the Armed Forces be maintained at a level preventing the military-strategic superiority of imperialism. "The CPSU," stresses the Party Program, "will make every effort to ensure that the USSR Armed Forces maintain a level ruling out the possibility of strategic superiority by the forces of imperialism, to ensure comprehensive improvement of the defense capability of the Soviet State and to strengthen the fighting alliance of the Armed Forces of the brother socialist countries." This conclusion and guideline, reflecting the new political realities, at the same time constitute an important contribution to Marxist-Leninist teaching on war and the army. Soviet military doctrine, it is emphasized in the new, revised Party Program, is purely defensive in nature and is directed toward defense against external attack.

The CPSU Program also states specifically ways to achieve further improvement of the Armed Forces in conditions of an international situation which has become aggravated through the fault of imperialism and reflects increased demands on strengthening their combat potential, which comprises a solid fusion of military skill and a high level of equipment, ideological firmness, organization and discipline on the part of personnel, and their faithfulness to patriotic and internationalist duty. Also contained in this point is the party's appraisal of the combat power of the Armed Forces, viewing it as an integral structure and a unity of elements of the very highest quality.

"Communist Party guidance of military organizational development and of the Armed Forces," states the CPSU program document adopted by the 27th Congress, "constitutes the fundamental basis for strengthening the defense of the socialist homeland." The party's leadership role is growing immeasurably today, the result of a number of factors. Principal factors include the increasing complexity of external political conditions in connection with increased aggressiveness by imperialism, the need for further increasing

vigilance and ensuring additional efforts to restrain the forces of aggression and to hold the arms race in check, and to save mankind from the threat of nuclear war. In these conditions the party's collective intelligence and volition constitute a most important precondition for guaranteeing security of the USSR, its friends and allies. Implementation of the leadership role of the CPSU is being carried out within the channel of the party's principal course of strategy, directed toward accelerating the socioeconomic development of society and improving all aspects of societal affairs.

These are some of the theoretical and political points of the new, revised Third CPSU Program, augmented and creatively amplified in conformity with historical experience, our country's development prospects, and the tasks of further strengthening its economic and defense might.

Profound assimilation and comprehension by party members and all military aviation personnel of the revolutionary spirit, the ideological-theoretical wealth and organizing force of the program points, and acceptance of the party's new guidelines and demands as their own vital concern serve as an essential condition for the success of the restructuring of the organizational, ideological, political indoctrination, management and other domains of military activity taking place in the Air Forces. Initial experience and the lessons of restructuring in Air Force units and subunits confirm that only a sense of the new and a desire to work in the new manner, demandingness and honesty, and the ability to take responsibility and to see the political significance of one's actions make it possible to achieve genuine increase in combat readiness, in the level of competence of flight personnel and specialist personnel of all aviation services, and help increase flight safety and strengthen military discipline and order.

A persistent campaign to achieve excellent results in combat and political training in the new training year has been in full swing in aviation units and subunits and at Air Force schools since the very beginning of the winter period of training. The points, demands, and tasks articulated in the new, revised CPSU Program -- a program of orderly, comprehensive improvement of socialism and further advance by the Soviet society toward communism on a foundation of acceleration of our country's socioeconomic development and a campaign for peace and social advance -- find specific embodiment in the selfless labor of Communists in the military as well as all military personnel.

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SQUADRON GROUND CREWS KEEP AIRCRAFT FLYING SAFELY

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 12, Dec 86 (signed to press 31 Oct 86) pp 14-15

[Article, published under the heading "Advanced Know-How Put Into Practice by Aviation Engineer Service," by Lt Col N. Mulyar: "Strengthening Flight Operations Shift Discipline"; first paragraph is AVIATSIYA I KOSMONAVTIKA introduction]

[Text] The party expects of each and every leader, of each and every Communist not pledges and assurances but actual deeds.... Acting with initiative, with persistence, vigorously, and with a strong sense of responsibility -- this is required today of each and of all. (From the proceedings of the June 1986 CPSU Central Committee Plenum)

The flight operations shift was a particularly difficult one for the squadron in which Maj V. Lukyanenko serves. The pilots were working on maneuver sequences in instrument weather. And I must say that the entire operation -- from takeoff by the weather reconnaissance aircrew to taxi back to the ramp by the last plane -- was organized with precision. Aviation engineer service ground maintenance personnel worked hard, ensuring that there were no aircraft departure delays.

The precise rhythm and effectiveness of a flight operations shift depend on many factors. The proficiency and moral-psychological conditioning of the ground crewmen, their feeling of responsibility for readying aircraft for flight operations, their flawless efficiency and discipline are all equal factors.

A characteristic feature of flight operations shift discipline is the fact that it presupposes close coordination among aviation personnel and includes personal and group responsibility for accomplishment of combat missions. All this imposes stringent demands on the job proficiency of the ground crewmen taking part in flight operations, a higher degree of organization and orderly routine. And how could it be otherwise? Any departure from specified performance standards, the points in operations manuals, the requirements of guideline documents, even the very slightest, as well as delayed or sometimes out-of-sequence performance of an operation can cause serious consequences and

adversely affect the quality and safety of a flight operations shift, and can cause unnecessary expenditure of supplies and resources.

In a neighboring subunit an incident once occurred where the drag chute suddenly popped out as an aircraft was landing. A subsequent investigation ascertained that WO N. Rodnev, who had set the chute, had forgotten fully to latch the system. This was a glaring violation of procedures discipline. And there were two guilty parties -- the person who rigged the chute, and the person who checked performance of this operation. Naturally they were punished for negligence. This offers additional proof that only unswerving observance of the requirements of documents governing mishap-free flight operations and precision actions by personnel can ensure smooth, reliable adherence to the flight operations schedule. Unfortunately this is not always the case.

That same day another aircrew had to wait almost half an hour for permission to fire up engines -- ground crewmen had discovered that certain engine operating parameters were not right. A question naturally arises: where had they been prior to this? Why had the aircraft been poorly readied for flight operations? This was a gross violation of procedures discipline.

Thus it became necessary hastily to "rearrange" the flight operations schedule due to various organizational problems and interruptions in the work process flow, occurring through the fault of undisciplined airmen. And yet any haste is a hindrance. And in such an instance how can one talk about flight operations shift effectiveness? People only remembered its negative aspects, the mistakes made by its organizers and instances of violation of procedures discipline by aviation engineer service specialist personnel.

Positive experience in organizing and conducting efforts to strengthen flight operations shift discipline has been amassed in the squadron in which officer V. Lukyanenko serves. The men of this squadron prepare most thoroughly for flight operations. Serious attention is devoted to improving organization on the ground and in the air. The squadron commander, the political worker, subunit party and Komsomol activists indoctrinate the young ground maintenance personnel with examples of vanguard performers in competition, and they teach them to be efficient and conscientious in aircraft servicing and maintenance. In this subunit's classrooms and laboratories they have set up display stands with materials publicizing advanced know-how in servicing aircraft systems and showing the importance of flight and procedures discipline for flight safety. There are plenty of good performers to emulate in the squadron. A high degree of discipline, efficiency, and conscientious performance of job duties characterize the overwhelming majority of Lukyanenko's colleagues -- aviation engineer service officers. One out of every three is master proficiency-rated. It is not surprising that they also perform coolly, with precision and composure in the most difficult situation, endeavoring to do everything in their ability to improve squadron combat readiness and ensure flight safety.

A good deal is being done in this squadron to infuse every training class, drill, and flight operations shift with a spirit of competition. Nor is it surprising that the men of this outfit are leaders in socialist competition and successfully completed the training year. Healthy rivalry motivates young

officers and their men to improve their proficiency and boost their proficiency rating. Unswerving observance of military, plan/schedule, procedures and execution discipline, as well as firm observance of regulations are adopted as a separate point in the socialist pledges of aircraft maintenance personnel.

In this vanguard squadron they skillfully utilize the achievements of the finest specialist personnel, gather their experience and know-how bit by bit, and skillfully adopt it in practical preparation for and conduct of flight operations shifts. The men of this squadron prepare conscientiously for every flight operations shift. The commanding officer, the political worker, and the deputy commander for aviation engineer service consider all factors which determine accomplishment of the flight operations schedule. Special attention is devoted to strict observance of military, flight, and servicing and maintenance procedures discipline. This line runs through all measures connected with airmen's preparations for flight operations. A chart has been prepared in the squadron, depicting observance by aviation engineer service personnel of procedures discipline in readying aircraft for flight operations. This has been done to ensure continuous objective monitoring of servicing and maintenance of aircraft both during preliminary preparation and during flight operations.

It was noted in the proceedings of the June (1986) CPSU Central Committee Plenum that already today the situation can be substantially improved "...with a conscientious attitude toward the job at hand, strengthening of labor and procedures discipline, and implementation of a number of urgent organizational-technical measures...." Guided by these points, party member-officers V. Gladyshev, S. Grakholskiy, V. Svitskiy, and A. Shostak endeavor to create in the military collective an atmosphere of active innovation and assess their men's performance in an exacting and high-principled manner. They support initiative by subordinates and prize each and every minute of training. The officers' closeness to their men and concern with their off-duty needs, living conditions, and health positively influence not only discipline but also the job competence of aviation engineer service personnel.

Innovators in this vanguard subunit are also constantly concerned with quality of results and successful conduct of a flight operations shift. Specialist 1st Class Sr Lt V. Burdygov, for example, aircraft equipment group chief, designed a stand containing four testing packages. This piece of equipment helps save time and eliminates unnecessary moving back and forth. Depending on the requirements of a flight operations shift, two ground crewmen, without leaving their work station, can perform several types of aircraft inspection procedures in a short period of time. In particular, they check the adjustment of engine automatic control units, rpm and temperature gauges, check operation of battery charge circuit breakers, and also test accuracy of pressure gauge readings.

Aircraft servicing and maintenance personnel at the field are working with full effort and at high intensity, ensuring a smooth rhythm to flight operations in the interests of a high degree of aircrew and squadron combat readiness.

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NIGHT RADAR-BOMBING TANK COLUMNS

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 12, Dec 86 (signed to press 31 Oct 86) pp 15-17

[Article, published under the heading "For a High Degree of Combat Readiness," by Military Navigator 1st Class Maj G. Bochkarev: "Tank Column in One's Sights"]

[Text] The combat jet aircrew consisting of Capt P. Morozov and Sr Lt V. Makarov was to fly a performance-graded training sortie involving bombing a tank column. The airmen carefully calculated the mission profile, drew up a detailed plan of action, and endeavored to provide for possible variations of change in the air and ground situation.

They devoted particular attention to modes of locating the targets, nor is this surprising, for it is no simple manner to spot and destroy tanks. It is important to consider weather conditions, optimal airborne radar operating mode, and aiming method. If the target was standing in place, it would be a fairly simple matter to select a radar reference point and aim off this point. But one could not count on such ideal conditions. Most likely they would have to bomb a moving column. This would require a skilled effort to obtain a clear radar return of the tanks on the radar display or, knowing the rate of column movement, determining its possible location in advance and working in close coordination with ground subunits and other aircrews providing follow-up reconnaissance and target illumination.

After making careful calculations, Captain Morozov and Senior Lieutenant Makarov, taking obtained intelligence into consideration, decided to deliver the strike when the tanks began moving out of the concentration area to the attack position. The aircrew made this decision because at this moment it would be easier to distinguish actual targets from dummy positions set up by the "enemy," and therefore it would be possible to place a stick of bombs on the target with greater accuracy.

The aircraft took off on schedule. Strictly adhering to the planned route, the aircrew penetrated air defense undetected and reached the search area. As they approached the area Senior Lieutenant Makarov identified the reference point selected as aiming-off point. Soon bombs precisely "carpeted" the tank column.

The commanding officer commended Capt P. Morozov and navigator Sr Lt V. Makarov for their high degree of professionalism. They deserved it.

Bombing tanks is one of the principal tasks of aircraft supporting ground troops. It can be accomplished in various ways, but there are a number of specific features involved. Aircrues operate at low altitudes. Consequently pilots must possess excellent flying technique and have the ability quickly and knowledgeably to understand and analyze "enemy" combat formations and dispositions and correctly to determine those points which can be hit with greatest effect. In addition, under these conditions the effective range of airborne electronic gear is appreciably reduced, and this makes it more difficult to navigate and accomplish approach to the target both as regards proper location and timing.

Bombing tanks at night is the most complicated kind of combat flying. At night the range of possibilities narrows. It is more difficult to get one's bearings visually, and it is practically impossible in conditions of solid cloud cover and total blackout. These and other factors impose rigid demands on aircrue selection and training, and for this reason in our subunit aircraft pairs and flights are made up taking into consideration the psychological compatibility of crew members. After mastering precision formation flying, the aircrues proceed to weapons delivery. The instructors make the tactical environment more difficult with each new maneuver sequence and teach the crews correctly to select different variations of strike delivery.

Experience has taught us that brief tactical drills play an important role during this period. They are conducted in an interesting manner, for example, in the flight led by Military Pilot 1st Class I. Spivak. In the first drill an experienced methods specialist usually "concentrates" tanks at the march start point. Using large-scale maps and photomap plotting boards, they determine the possible number of columns, their routes to the starting point, and the areas in which it will be most difficult for them to remain concealed. The next time the aircrues themselves "deploy" tanks on the terrain close to an arbitrary battle line, and select what in their opinion are acceptable means of providing air cover. Considering all these factors, they then work up the most effective modes of attack. The commander does not inhibit his men's initiative but gives each combat airmen the opportunity to state his point of view. The result is a group-elaborated opinion which provides optimal variations of placing accurate fire on the targets in case of change in the ground situation.

The flight accomplishes training sorties with excellent quality and is a consistent socialist competition leader. The experience of Capt I. Spivak was synthesized by party activists and disseminated in other collectives.

After mastering the procedures of bombing tanks by day, aircrues proceed to night weapons delivery. Once again they have a number of new problems to solve. I shall discuss one of them in greater detail.

In the past, for example, we proceeded as follows. One of the aircrues would fly into the preselected grid square and release parachute flares. At this

time the strike element would perform aimed bombing. But we have now given up this method, since aircrews fully reveal their intentions and give away their actions.

Today, when many combat pilots have learned effectively to utilize the wealth of capabilities of their aircraft, we have begun more extensively employing airborne radar and blind bombing. But this technique is acceptable when the precise coordinates of an area in which tanks are concentrated in one place are known; this technique is little-effective, however, when a tank column is moving. What is the solution? A differentiated approach to selecting methods of detecting tanks helped.

...The element in which Maj V. Voronchikhin flew lead navigator was assigned a mission to hit a tank subunit disposed directly forward of defending-force strongpoints. Thoroughly studying the situation, the commander made his decision: the aircrews would proceed to the target at brief time intervals so that the "enemy," even if he detected aircraft behind his lines, would be unable to bring fire on them. He recommended that the pilots and navigators familiarize themselves with photographs of airborne radar displays clearly showing returns from tanks and thoroughly study their characteristic features. Airmen who had received marks of excellent on night bombing sorties shared their experience and know-how with their comrades.

Finally the strike aircraft took off. Bypassing hazardous zones, they approached the checkpoint in sequence and from that point altered heading to the designated grid square. Peering intently at their radar displays, the navigators constantly changed operating mode. Soon blips began to appear which were similar to those they had seen on the photographs. There was no doubt that these were their targets. And although the tanks were moving, each crew performed aimed bombing. The element received a mark of excellent on the mock combat sortie.

During this year of the 27th CPSU Congress the airmen of our subunit worked hard to master combat skills, increasing combat readiness day by day. Using amassed know-how and experience as a foundation, they have made a good beginning in the new training year.

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COMBAT PILOTS GUILTY OF VIOLATING FLYING PROCEDURES, RULES

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 12, Dec 86 (signed to press 31 Oct 86) pp 16-17

[Article, published under the heading "Constant Attention to Flight Safety," by Lt Col V. Grishkevich: "Afterburning... out of Curiosity"]

[Text] Strict observance of flight regulations prescribed by the corresponding guideline documents is an essential condition for successful advance by combat pilots to the heights of military expertise. A rather self-evident statement. Follow it, and your professional growth is ensured! The overwhelming majority of airmen in the Red-Banner Belorussian Military District do so. Lt Col S. Mikhaylenko and V. Larkov, Maj N. Polishchuk, Capt S. Lavrichenko and many others always fly their training sorties in an exemplary manner and display initiative in the air and efficiency. They are always successful in their combat training. As a rule they destroy the "enemy" on the first pass, with the first missile fired.

Unfortunately, however, some pilots ignore flight safety requirements and cause air mishaps and mishap-threatening situations. When one gives thought to why this happens, analyzes, compares negative facts, and analyzes a given violation, one always comes to the conclusion that many occur due to ignoring the requirements of flight discipline.

...There was a solid overcast. For this reason particular alertness and strict observance of flight rules and regulations were demanded of aircrews going up. Capt N. Apruskin was also aware of this. He acted as he saw fit, however. While practicing flying technique in the practice area, he repeatedly lit his afterburners without any need to do so. And on his landing approach, instead of bringing it on in he streaked over the field on afterburner.

Could it be that this pilot did not clearly understand the processes which take place in an engine which frequently operates on afterburner? That is not probable. Apruskin is a first-rate pilot and should know that his playing around could cause problems with his engine and lead to other, more dangerous consequences.

Capt N. Apruskin gave the following reply to a question by fellow officers why he, an experienced pilot, could have done what he did: "I was curious to see how fast the fighter would go, so I lit the afterburner."

Apruskin's "experiment" was thoroughly discussed in the collective. His misdeed was universally censured. This pilot had to take additional tests on his knowledge of the specific features of aircraft operation. Only after this was he again authorized to fly.

Here is an example of a different kind. Receiving takeoff clearance, Capt A. Sergeyev confidently put his fighter-bomber into the air. All conditions favored successful accomplishment of the assigned mission. But instead of flying at the specified heading and specified altitude, this pilot arbitrarily proceeded otherwise. Sergeyev made a left turnout instead of the right turnout prescribed for his training sortie. He also delayed the turnout and failed to obey tower instructions to proceed to and maintain the assigned flight level. As a result the combat aircraft crossed the path of a transport aircraft, very close to that aircraft. This was a mishap-threatening situation.

Nor was this incident ignored in the collective. Severest measures were taken.

"Why did this pilot fail to follow the prescribed mission configuration?" I asked the flight commander. "Was this perhaps required by an unexpectedly changed air situation?"

"No," the officer replied. "Conditions were ideal."

It turns out that Sergeyev thought up his own "conditions." He assumed that no harm would come from it, but the sky does not forgive mistakes. Flight regulations are strict. Even the slightest deviation cannot be tolerated. Counting on things coming out all right invariably leads to air mishaps and mishap-threatening situations. Every military pilot should possess solid knowledge of and carry out the requirements of documents governing flight operations and display an implacable attitude toward conceitedness and complacency.

Sometimes a pilot who has failed to adhere to his training sortie configuration claims that he acted in conformity with the situation. Incidentally, Capt A. Sergeyev also tried to use this argument. But all initiative is not alike. If it was in fact dictated by a changed air situation, then such initiative must be welcomed. It fosters higher-quality accomplishment of the mission. But one can in no way condone the "initiative" of Capts A. Sergeyev and N. Apruskin. It is to the credit of these pilots that they self-critically appraised their misdeeds and reached correct conclusions.

But what is the main cause for concern here? Experienced pilots well familiar with regulations sometimes depart from them and fail to adhere to the requirements of the appropriate documents. Analysis indicates that this results from an elementary lack of discipline: an insufficiently serious

attitude toward study of theory, lack of concentration during the period of preparation for flight operations, and a lip-service approach to practice drills, for the fact is that some flight commanders at times fail to pay attention to this. They fail to teach their men follow-through and conscientiousness, and they fail to be constantly demanding on them.

It sometimes happens that a combat pilot does a fine job in the air, but back on the ground he violates regulations. And when he is admonished for this, he frequently replies: "Flying is the main thing!"

This is a dangerous delusion! Particularly if a commander who is pleased with a subordinate's performance in the air fails to take note of indications of lack of discipline and does not respond firmly to an airman's acts of misconduct. But it is wrong to divide discipline into ground discipline and air discipline. It is an integral thing. And if somebody fails to understand this, it is always possible that in time certain pilots may display the desire to conduct some "experiment" in the air....

In the aviation squadron commanded by Lt Col V. Larkov, the slightest deviation from flight regulations is always publicized. It is discussed at staff meetings and at meetings of officers. Communists and Komsomol members also periodically discuss at their meetings matters of discipline and organization in the air and on the ground. They themselves display an example in their work activities and conduct.

A persistent effort is made to instill in aviation personnel honesty and frankness as well as a feeling of personal responsibility for a safe outcome of every flight. And the main organizer of all this is the commander himself -- a demanding individual of integrity. And the squadron commander is equally demanding in large things and in small. He also develops in his subordinates such a style and attitude toward job-related activities. And this makes it possible to maintain proper order and discipline not only on the ground but in the air as well.

It is a well-known fact that a high degree of efficiency and conscientiousness are inseparably linked with strong moral fiber, heroism and courage on the part of airmen, as well as their faithfulness to combat traditions. It is the duty not only of commanders and political workers but of the airmen themselves to develop in aviation personnel these outstanding Soviet character traits and to seek to ensure that they become a standard of daily conduct.

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SOVIET JOURNALISTS VISIT BULGARIAN MILITARY RADAR FACILITY

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 12, Dec 86 (signed to press 31 Oct 86) pp 26-27

[Article, published under the heading "In Brother Armed Forces," by Col Ye. Besschetnov, AVIATSIYA I KOSMONAVTIKA special correspondent: "Reliability"; first paragraph is AVIATSIYA I KOSMONAVTIKA introduction]

[Text] A group of Soviet military journalists, including the author of this article, visited their Bulgarian colleagues. During this visit they took part in get-togethers with military personnel of the Bulgarian People's Army. The following article tells about the daily life, work and combat training of the personnel of a radiotechnical [radar and electronic communications] subunit of the Bulgarian People's Army [BPA].

The subunit commander was away from the base, on important business at a practice range. His duties had temporarily been taken over by the deputy commander for technical affairs, officer D. Donchev, a man slightly above medium stature, well built, smart of appearance, with a quick, flashing gaze, a kindly smile on a dark-skinned face, and a black, neatly-trimmed moustache. After introducing ourselves and a brief conversation at headquarters, we -- a small group of Soviet military journalists visiting Bulgaria on the invitation of top officials of the BPA -- accompanied by Comrade Donchev and the deputy commander for political affairs, Lt Emil Penov, headed out into the post compound to view specialist personnel at work.

It was a warm, sunny day. At the edge of the post compound, where the electronic gear was located, we saw a surveillance radar dish antenna. Smoothly rotating in a full circle, it probed the surrounding airspace with a radar beam. Bundles of cables snaked away from the radar, disappearing into the grass, heading toward a small slate-roofed shed, which housed equipment-carrying vehicles standing on supports. The door of one of the vehicles was partly open, and we could hear the monotonous humming of operating equipment coming from the interior. Inviting us to climb aboard, Donchev and Penov brought up the rear.

Personnel on duty included two radar operators and a young shift officer in charge. The equipment was of Soviet manufacture, but there was also a local touch, such as a special device designed to provide a substantial decrease in

radio-frequency interference as well as a number of additional functions, suggested and built by innovators in the subunit. We were told that people from the factory had carefully examined the device and had expressed willingness to put it into production.

On the close-in display a fine scanning line, one end riveted to the scope center, swept in a continuous circular pattern, producing whitish blips as it swept -- ground clutter and echoes from aircraft passing along an air corridor heading toward a civilian airfield. The air situation was also depicted on other displays. The radar operators closely watched every target. Nothing escaped their vigilant gaze.

Exchanging a few words with his subordinates on how the duty shift was going, officer D. Donchev was pleased with their performance and wished them success.

"Nothing much happening today," Donchev, who spoke Russian well, told us. "There are few civilian aircraft on the airways, and there is no traffic out of the military airfield for which our people provide service. Usually we have a lot more work to do. Sometimes we must track several targets. In addition, we must continuously maintain airspace surveillance over toward the border."

Donchev and Penov explained that the subunit operated several additional radar sites, but since Bulgaria was mountainous for the most part they were scattered out dozens of kilometers from the post, deployed at locations high in the mountains, in order to provide surveillance over as large an area as possible. Radar operators at the remote sites are frequently visited by the commanding officer, his deputies, and other officers: they check how things are going, give the men assistance in successfully performing their job duties, make sure that they are supplied with everything they need, and organize training.

The people we talked to expressed satisfaction with the fact that the men of the subunit were doing a good job of standing alert duty, were doing a precision job of providing radar service for the pilots of a fighter regiment, were providing vigilant surveillance of an extensive area of airspace along the border, and were making a contribution toward maintaining a high degree of vigilance and combat readiness of the men of the PBA.

A great many outstanding specialist personnel -- true experts at their job -- were trained in this subunit. The first person mentioned was radar facility chief Capt Grisha Dimov, a member of the Bulgarian Communist Party. He graduated with honors from service school and has had many years of experience working on combat equipment and with personnel. He possesses expert knowledge of the complex equipment, thoroughly understanding all its finer details. This officer has also proven to be a skilled mentor to his men. He does a great deal to ensure vigilant performance of duty by alert-duty specialist personnel. His work experience and know-how have been passed on to other officers of the BPA radiotechnical troops.

The list of vanguard officers also includes party member radar facility chief Capt Doncho Manikatov. The team he heads stands among the subunit's leaders

in training results and job performance. Manikatov works hard with his men and is constantly concerned with ensuring that the equipment operates reliably and that his men stand alert duty with precision and reliability.

"Service in the army," Comrade D. Donchev shared his observations, "has become a family tradition, as it were, for many Bulgarian officers."

He cited as an example Capt Nikolay Penev and Sr Lt Ventseslav Pekhlivanskiy. They were born to the families of military men. From childhood their lives had been linked with the military. Both of their fathers are still serving honorably, holding important positions in the BPA. Now their sons are following the path of faithful service to their people. Penev Junior graduated from a higher military communications school in Kiev. Working on an automated control system, he proved to be a highly-competent specialist. He enrolled in a service academy this year. Ventseslav is also a graduate of a military higher school. He has commanded a radar company for a number of years now. The outfit he heads has a good performance record. This officer expressed the desire to continue his education at the academy level, and the command authorities gave their approval. Captain Penev and Senior Lieutenant Pekhlivanskiy, as representatives of a new generation of Bulgarian officers, are firmly preserving their family honor and are working persistently to build upon fine combat traditions.

I believe that it is appropriate here to mention the following. While we were still at headquarters, officer G. Todorov, an instructor at the Bulgarian Military Academy imeni G. Rakovskiy, who was conducting practical training with his students using the subunit's facilities, walked into the commanding officer's office. He greeted us warmly and was quite willing to talk. We discussed the system of training military cadres in the BPA. Comrade Todorov and Bulgarian military journalist officer G. Borislavov, who was accompanying us, alternately taking the chain of conversation, related to us a great deal of interesting information. In particular, more than 80 percent of the officers in the Bulgarian People's Army are members of the Bulgarian Communist Party (BCP), and more than 10 percent are members of the Dimitrov Young Communist League. Approximately 70 percent of officers possess a higher or secondary specialized education, while one out of every three has had engineering or technical training.

Acquaintance with the combat performance of the officers of the radiotechnical subunit once again confirmed the high level of their professional training. But not only the officers are the pride of that outfit.

"Our enlisted personnel are also doing a good job," noted Comrade D. Donchev. "Concern with further improving the training process as well as painstaking indoctrination work with primary-rank enlisted personnel and NCOs are producing gratifying results. The number of knowledgeable, skilled radar operators, radiotelegraph operators, and other communications personnel is growing."

The officer had praise for senior radar operator 1st Sgt Stanko Tomov. He has a master proficiency rating and confirms this high rating with his job performance. The list of the top performers also included Sr Sgt Vasil

Velichkov, who for several months had been successfully serving as acting radar station chief, as well as radar operators 1st class Jr Sgt Krasemir Todorov, Rumen Tsvetkov, and others.

As we leisurely continued our conversation, we approached a one-story building of light construction. It was a classroom building. One's attention was drawn by an attractive poster on a tall display board to the left of the entrance, with an inscription typical for the BPA: "Our friendship is indissoluble and sacred." What it meant of course was the friendship between the USSR and the People's Republic of Bulgaria, between the CPSU and the BCP, and between the men of the Soviet Armed Forces and the Bulgarian People's Army.

Officers D. Donchev and E. Penov led us into the building. We toured all the training classrooms, inspecting their equipment and becoming acquainted with the training methods being used.

The training facilities made perhaps the deepest impression on us. The classrooms were excellently equipped with diagrams, working models, and training simulator equipment. And the men themselves had constructed everything, from design sketches provided by efficiency innovators. And they had done a conscientious, caring job, with a profound commitment to help the young specialist personnel master their military occupational specialty as well and as rapidly as possible.

"The endeavor to train as well as possible all specialist personnel without exception and successfully to accomplish the missions assigned to the subunit," said the deputy commander for political affairs, continuing our discussion, "is of course for us, just as it is for any other military outfit in the BPA, a vital concern connected with protecting and defending our country. But the Bulgarian People's Army is part of the Warsaw Pact Joint Forces. We continuously remain aware of our internationalist tasks and devote considerable attention to indoctrinating officers, primary-rank enlisted personnel, and noncommissioned officers in a spirit of friendship and brotherhood with the fighting men of the armies of the nations of the socialist community, especially with the men of the Soviet Armed Forces, and we maintain contacts with them in performing various joint tasks."

We had the opportunity to see the correctness of his statement in a practical manner. For example, the nature of coordination between Soviet and Bulgarian military personnel in combat training was indicated in a rather substantial manner by a combined exercise conducted by Soviet and Bulgarian airmen, planned and scheduled by Warsaw Pact Joint Forces Headquarters, held during our visit to the BPA. And what could be better than joint activities to bring them closer together, to strengthen their friendship and cohesiveness?

Every place the group of Soviet journalists visited in the People's Republic of Bulgaria we saw vivid, persuasive evidences of the fact that the people of this country, including military personnel, are profoundly grateful to the great Russian people for that historic role it played in liberating Bulgaria from foreign rule -- in the names of streets and squares, in historical monuments, and in works of art. We observed the same thing in this subunit.

Portraits of famed Soviet military commanders and prominent military leaders hung on the walls at headquarters, alongside portraits of Bulgarian national heroes. In the commanding officer's office there were sets of bound files of Soviet newspapers and magazines. Many articles were annotated with penciled notes. This meant that people were reading and studying these materials. Soviet experience and know-how was being adopted.

It has long been a tradition in this subunit, just as throughout the entire BPA, to hold various events connected with celebration of the anniversary dates of the Great October Revolution, Soviet Army and Navy Day, and Victory Day. Three years ago, at the initiative of Dimitrov Komsomol, a patriotic movement was initiated in the BPA, under the slogan "Remembering." Its significance and principal purpose is to publicize the glorious combat traditions of the Soviet Armed Forces and the Bulgarian People's Army, further to strengthen the friendship between Soviet and Bulgarian military personnel, and to perpetuate the memory of those who reduced fascism to ashes at the cost of their own lives, carrying out their internationalist mission, liberating Bulgaria from Hitlerite tyranny. The personnel of this radiotechnical subunit took up active part in this movement.

The forms and methods of patriotic and internationalist indoctrination are diversified. Lectures and political briefing sessions are held, dedicated to major dates in the lives of the Bulgarian and Soviet peoples, and get-togethers are held with veterans of the army and the revolutionary movement in Bulgaria. Officers, primary-rank enlisted personnel, and NCOs learn more about the history of the emergence and strengthening of the friendship between the Soviet and Bulgarian peoples and their armies and gain a deeper understanding of the history of the armed struggle by their people against the Hitlerite occupation forces and monarchic-fascist rule, and of the combat operations fought by numerous partisan detachments and combat groups, which in the spring of 1943 joined together to form the People's Liberation Insurgent Army.

An event which took place on 8 September 1944 became one of the most important events in the lives of our two countries, when Soviet forces, carrying out their internationalist duty, marched onto Bulgarian soil, hastening the victory of the antifascist popular insurgency. The monarchic-fascist regime collapsed on the following day, and a government of the Patriotic Front came to power, declaring war on Hitlerite Germany. Victory was won by the Bulgarian people under the guidance of the BCP, with decisive help by the Soviet Army. The historic victory on 9 September 1944 signaled a radical turning point in the destiny of the people of Bulgaria, marked the beginning of decisive political and socioeconomic reforms in that country, and opened up the way for building a socialist society. The valiant Bulgarian People's Army today stands vigilant guard over these achievements.

...We became acquainted with the daily life, working routine and combat training of the men of just one BPA subunit, but the most characteristic features inherent in the Bulgarian People's Army -- an important component part of the Warsaw Pact Joint Forces -- were reflected in this subunit as in a drop of water. When we departed, we carried away with us a feeling of firm confidence in the strength and reliability of the men of this brother army,

grounded on their dedicated faithfulness to the ideals of socialism, on a high degree of combat skill, and on their endeavor to strengthen in every way possible the friendship and close cooperation with the men of the Soviet Armed Forces.

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PERFORMANCE-GRADING BURST POINT DEVIATION WITH PROGRAMMABLE CALCULATOR

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 12, Dec 86 (signed to press 31 Oct 86) pp 32-33

[Article, published under the heading "The Pilot and the Computer," by Col Ye. Makarov and Military Pilot 1st Class Lt Col O. Sivukhin: "Figuring Ground Target Strike With Programmable Calculator"]

[Text] Flight operations were in progress. Suddenly the alarmed voice of Sr Lt N. Tsarev sounded over the control-tower speaker: "This is 606, solid IFR, altitude 5,500. My artificial horizon is out...."

"Calm yourself! Use your backup instruments and climb until you break out of the clouds," the flight operations officer instructed him.

Running ahead, we can report that the young pilot followed the prescribed procedures, made his way back to his home field and landed safely. Regular practice sessions on the flight simulator, working on emergency procedures, proved helpful. As we know, they do an effective job of developing quick thinking and the ability to perform logical analysis, which in such situations perform the function of a kind of "traffic controller" guiding a pilot's perception of the situation and his actions. The pilot described the incident as follows: "Upon entering the clouds I concentrated my entire attention on maintaining proper heading and rate of climb. On checking my heading I noticed that the course deviation indicator card had begun slowly drifting to the right. At first I thought that the course deviation indicator had failed. I glanced at the artificial horizon -- it showed wings level. I looked at the turn and bank indicator -- the needle had moved one mark to the left. This meant that I was in fact in a bank. It felt like the aircraft was in a wings-level climb, however. I decided to check immediately to determine which instrument was malfunctioning. If the artificial horizon had failed, with zero rate of angular motion it would indicate a bank."

The pilot smoothly brought the turn and bank indicator needle to the zero index mark. The course deviation indicator card stopped turning, and the artificial horizon showed more than 30 degrees bank to the right. Using the turn and bank indicator and the course deviation indicator, he turned his aircraft to the prescribed heading and reported failure of his artificial horizon. On instructions from the flight operations officer, he climbed out

of the clouds and used his backup instruments to fly a straight-in landing approach.

As is evident from this example, the pilot's procedures in an emergency situation depended on checking to see if certain conditions were met, conditions which determined his subsequent actions, actions which would vary in structure and content. In the article entitled "Calculating Target Approach Maneuver Elements" (AVIATSIYA I KOSMONAVTIKA, No 11, 1986), the author notes that algorithms in which an action or group of actions can be performed in relation to certain conditions are called branching algorithms.

As demonstrated in the example cited above, there exist algorithms of branching calculation processes, akin to branching algorithms which describe processes connected with the actions of a human operator and technical devices. In such processes, depending on the input data or intermediate results, one must select a specific sequence of calculations, that is, follow different branches of the solution algorithm. These are called branching calculation processes. They are characterized by the existence of an analyzer, which tests to determine whether a certain condition is true ("yes") or false ("no") and proceeds to specific calculations based on the results of this test. If either of any two alternative possibilities arise in the course of calculations, the solution algorithm should contain segments for calculating each variation and operate according to either, depending on whether a specified condition is or is not satisfied. These segments are called algorithm branches, and the programs are called branching programs.

There are specific features to programming branching processes. Let us assume that the numbers A and B have been entered into the PMK [programmable calculator]. We look at the display, expecting to see the maximum value of one of them. But the calculator does not respond, since it cannot "look" at these numbers simultaneously and "does not know" what "maximum" is, since such concepts as "greater" or "less" are abstract (greater or less than what?). But it "understands" the difference A-B, which can be less than zero, zero, or greater than zero. For this, the PMK can test the following conditions: $X < 0$; $X = 0$; $X = \text{or} > 0$; X is not equal to 0.

The instructions $X < 0$, $X = 0$, $X = \text{or} > 0$, and X is not equal to 0 are logical statements and are called conditional transfer operators. They are entered into the program with the F prefix key and the keys above which these operators are indicated. Depending on symbols, the alternative condition test boils down to comparing with zero the contents of stack register X. If in calculating programming mode one presses the F key followed by the key marked with the selected condition (for example, $X = \text{or} > 0$), the instructions counter increments by 1. It will again increment by 1 with subsequent entry of a conditional transfer address. Thus each conditional transfer instruction is a dual instruction, since it occupies two addresses in program memory.

We should stress that control is not transferred to the address indicated in the conditional transfer instruction if the condition is not satisfied. If it is, control is transferred to the address immediately following the conditional transfer instruction.

In addition to conditional transfer instructions, unconditional transfer instructions are frequently used in branching programs. They are used when it is necessary to bypass a certain program segment according to the problem solution algorithm. The unconditional transfer instruction is also a dual instruction and consists of unconditional transfer operator BP and a control transfer address. For example, if in programming mode one presses the BP key and then enters a number, such as transfer address 21, for example, the instructions counter increments by 2. Conditional and unconditional transfers are used in programming various applied aviation problems.

For example, we want to create a program to estimate accuracy of fire on a ground target if the point of burst is at coordinates X and Y. Performance mark earned: 5 -- if the burst falls within the circle with a radius of r_1 ; 4 -- within circle r_2 ; 3 -- within circle r_3 ; 2 -- outside circle r_3 (see following diagram). A diagram of the solution algorithm for this problem also follows.

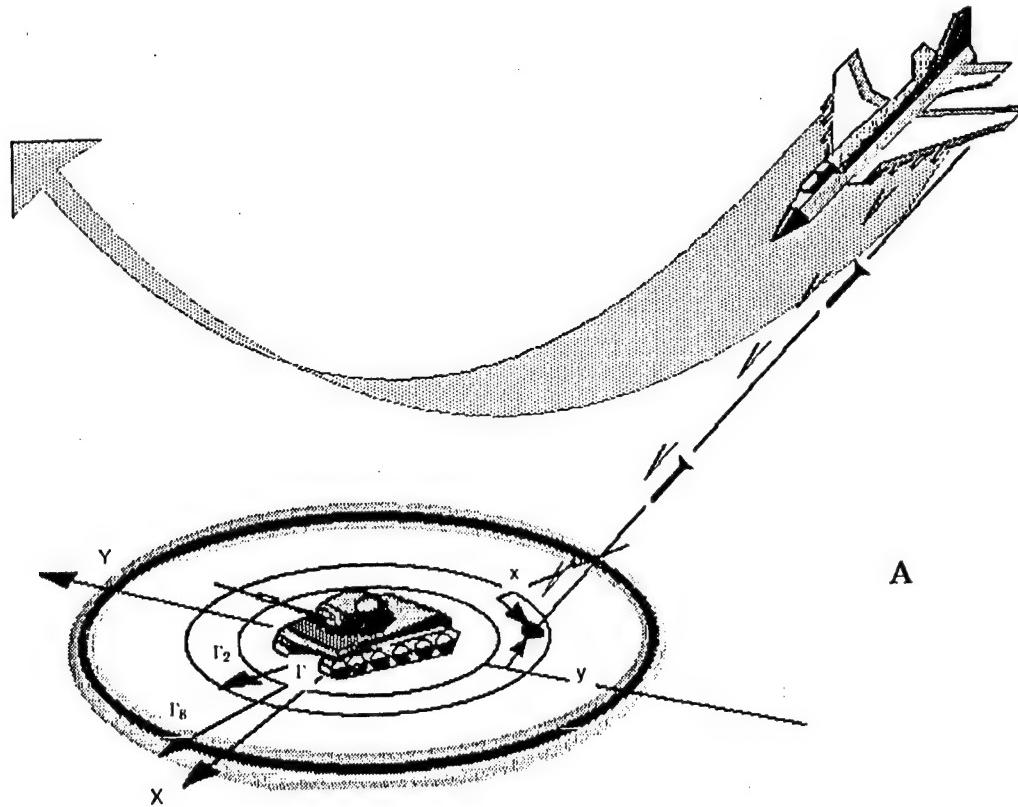
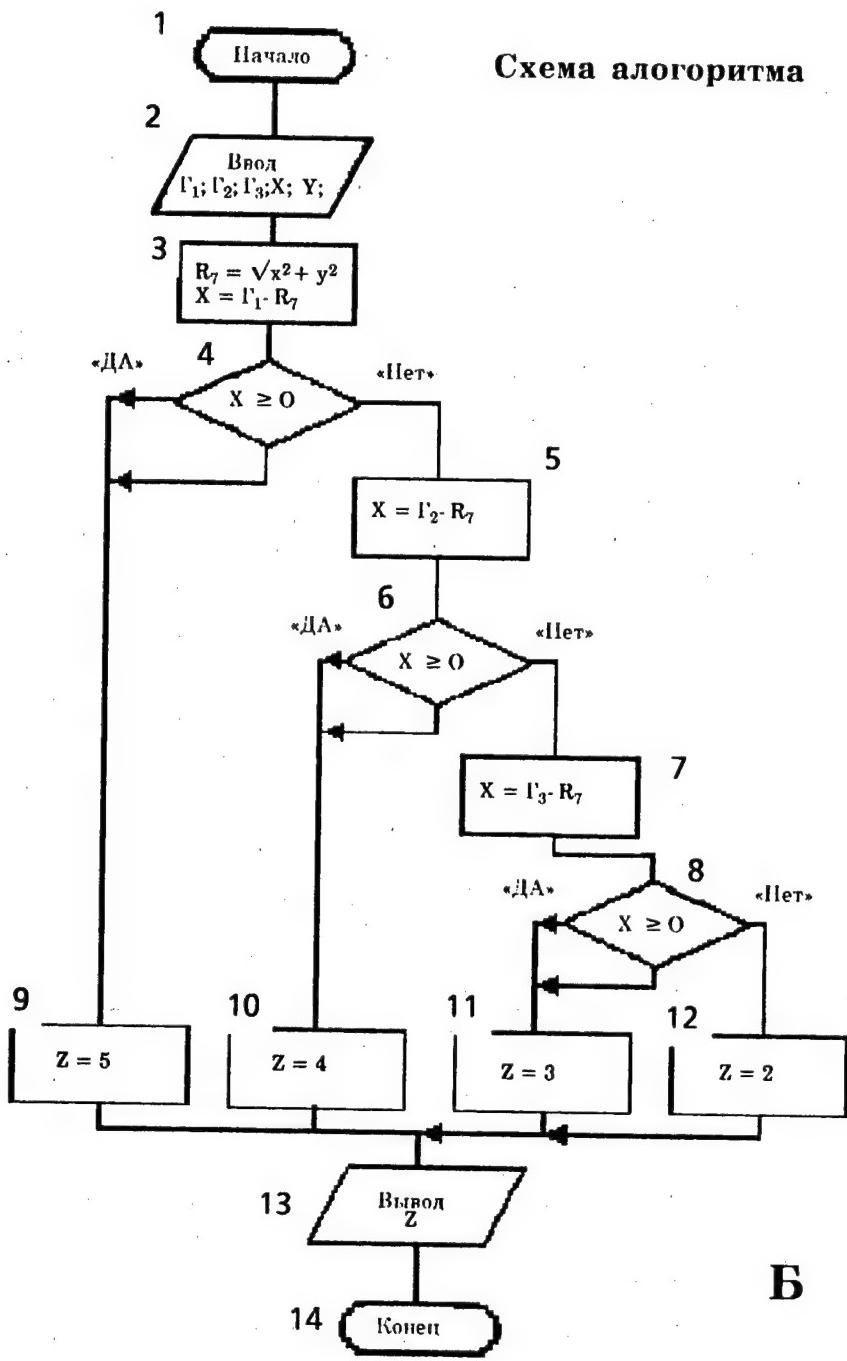


Схема алгоритма



Б

Diagram of algorithm

Key: 1. Begin; 2. Input; 4. Yes; 5. No; 6. Output; 7. End

(1)	Программа (2)	(3)	(1)	Программа (2)	(3)
Адрес	Команда	Код	Адрес	Команда	Код
00	ИИ18	68	17	—	11
01	FX ²	22	18	FX ≥ 0	59
02	ИИ19	69	19	23	23
03	FX ²	22	20	ИИ1У	64
04	+	10	21	БII	51
05	FV	21	22	32	32
06	II7	47	23	ИИС	6[
07	ИИ1A	6-	24	ИИ7	67
08	↔	14	25	—	11
09	—	11	26	FX ≥ 0	59
10	FX ≥ 0	59	27	31	31
11	15	15	28	ИИ3	63
12	ИИ15	65	29	БII	51
13	БII	51	30	32	32
14	32	32	31	ИИ2	62
15	ИИ1В	67	32	С/II	50
16	ИИ17	67	33	БII	51
			34	00	00

Key: 1. Address; 2. Instruction; 3. Code

Before creating the program we shall reserve data registers: P8 and P9 for input data -- burst point coordinates X and Y; PA, PB, and PC, for deviations r₁, r₂, r₃, respectively; P5, P4, P3, P2 for firing performance marks 5, 4, 3, 2 respectively. Register P7 -- operation register.

The above table contains a problem solution program corresponding to the above algorithm diagram and specified distribution of data registers.

Following is the sequence of program procedures.

1. F PRG, enter program, F AVT, V/O.

2. Load performance marks into registers: 5 into P5; 4 P4; 3 into P3; 2 into P2; load burst deviations into registers: r1 into PA; r2 into PB; r3 into PC; register P7 is the operation register.

3. Load burst point coordinates: X into P8; Y into P9.

4. S/P, result in register X and on display.

5. For new conditions X and Y go to 3. Calculation time approximately 5 seconds.

Check results for standard deviations: r1 = 2.5 m; r2 = 6.5 m; r3 = 11.5 m:

X	1,5 м	2,1 м	5,7 м	8,7 м
Y	1,9 м	1,6 м	6,3 м	9,8 м
оценка	5	4	3	2

performance grade

In conformity with the algorithm diagram, in the above program there are three conditional transfer instructions FX=or>0, addresses 10, 18, and 26. These are checkpoints in the program, as it were. If one's pass is in order (condition is met), one can proceed, and if not one must return to the address the number of which is part of the conditional transfer instruction.

Here is another example. We want to determine the parameters of a 360 degree nonsustained turn in order to plot its path.

The problem reduces to a numerical integration of differential equations in the following form:

$$\begin{aligned}\delta V_i &= g n_{xi} \delta t, \\ V_i &= V_{i-1} + \delta V_i, \\ V_{icp} &= (V_{i-1} + V_i)/2, \\ \omega_{bi} &= \left(\frac{d\varphi}{dt} \right)_i = \frac{g}{V_{icp}} \sqrt{n_{yi}^2 - 1}, \\ \delta \varphi_i &= \omega_{bi} \delta t \cdot 57.3, \\ r_{zi} &= \frac{V_{icp}}{\omega_{bi}}\end{aligned}$$

Control functions $n_x = f(V)$ and $n_y = f(V)$ are defined in the following sequence:

```
q = ρV²/2; Cyf,n = G/qS; Cy = Cyf,n ×  
Xпy зад;  
if  
  если Cy < Cy доп, то пy = Пy зад;  
  если Cy ≥ Cy доп, то пy = Cy доп / Cyf,n, а  
    Cy = Cy доп;  
    Cx = Cx0 + A Cy2;  
    Q = Cx g S;  
    nx = (P - Q) / G.
```

The following registers are assigned to input data for this program: P0 for V- θ ; P1 for G; P2 for rho; P3 for p-u zad; P4 for S-u dop; P5 for A; P6 for S-xo; P7 for R; PS for delta-t (c). Operation registers: P8, P9, PC, PD. The program for computing the parameters of a 360 degree nonsustained turn (V-i -- airspeed; delta-phi-i -- angle of turn, and r-zi -- instantaneous radius of turn at each step i of equation integration) is presented in a concise line-by-line listing of addresses and corresponding instructions (the reader is already acquainted with their listing in tables).

```

00.ИП0 01.3 02.. 03.6 04.÷ 05.П8 06.FX2
07.ИП2 08.×09.3 10.4 11.×12.2 13.÷14.ПД
15.П1/Х 16. ИП1 17.Х 18. П9 19.ИП3
20.Х 21.ИП4 22.— 23.FX<0 24.29
25.ИП3 26.ПВ 27.БП 28.33 29.ИП4
30.ИП9 31.÷ 32.ПВ 33.ИП4 34.FX2
35.ИП5 36.Х 37.ИП6 38.+ 39.ИПД 40.Х
41.ИП7 42.↔ 43.— 44.ИП1 45.÷ 46.ИПС
47.Х 48.9 49.. 50.8 51.1 52.Х 53.ИП8
54.+ 55.ПА 56.ИП8 57.+ 58.2 59.÷ 60.П8
61.ИПВ 62.FX2 63.1 64.— 65.F√ 66.9
67.. 68.8 69.1 70.Х 71.ИП8 72.÷
73.ПВ 74.ИПС 75.Х 76.5 77.7 78.. 79.3
80.Х 81.ПД 82.ИП8 83.ИПВ 84.÷ 85.ПВ
86.ИПА 87.3 88.. 89.6 90.Х 91.ПО 92.С/П
93.БП 94.00

```

Note: addresses 09-10 in the program are for entering wing area S. If quantity S contains more than two digit positions, subsequent instruction addresses will be displaced by the corresponding number of steps. For example, if S=72.8, addresses 09-12 will be required to enter this number. Therefore when setting up the address 23 conditional transfer (FX < 0), enter address 31 rather than 29, and when setting up address 27 unconditional transfer (BP) -- enter address 35 rather than 33. The program will end with address 96.

Program procedures sequence:

1. F PRG, enter program, F AVT, V/O.
2. Load input data into registers: V-o (km/h) into P0; G (kg) into P1; rho (kgc squared/m to the fourth power) into P2; p-u zad into P3; S-u dop into P4; A into P5; S-xo into P6; delta-t (s) into PC.
3. Determine from the graph P=f(V) for the corresponding flight level and airspeed V-i P (kg) and load it into P7.
4. S/P, results in registers: V-i in X and P0; delta-phi-i in PD; r-zi in PB.
5. To determine input parameters, in the following step go to paragraph 3.

The calculation ends when the aircraft turns to the required angle of turn or when airspeed decreases to minimum controllable airspeed.

Example:

$V_0 = 800 \text{ km/h}$; $G = 13500 \text{ kg}$; $\rho =$
 $= 0,1134 \text{ kg/m}^3$ ($H = 1000$); $n_{y_{\text{sat}}} =$
 $= 5,5$; $C_{y_{\text{abs}}} = 0,82$; $A = 0,21$; $Cx_0 = 0,018$;
 $\delta t = 1\text{c}$;

P -- variable parameter, determined by relation $P=f(V)$.

Step 1

$P_0=12,200 \text{ kg}$
In register X --- 792.2665
In register PD --- 13.746853
In register PC --- 921.79548

$V=792 \text{ km/h}$.
 $\delta\text{phi}-1=13.7 \text{ degrees}$.
 $r-y_i=921.8 \text{ m}$.

Step 2

$P_1=12,100 \text{ kg}$
In register X --- 785.03425
In register PD --- 13.877286
In register PC --- 904.54893

$V_2=785 \text{ km/h}$.
 $\delta\text{phi}-2=13.9 \text{ degrees}$.
 $r-y_2=904.5 \text{ m}$.

Step 3

$P_2=12,000 \text{ kg}$
 $V_3=778 \text{ km/h}$
 $\delta\text{phi}-3=14 \text{ degrees}$
 $r-y_3=888 \text{ m}$

Step 4

$P_3=12,000 \text{ kg}$
 $V_4=772 \text{ km/h}$
 $\delta\text{phi}-4=14 \text{ degrees}$
 $r-y_4=878 \text{ m}$, etc.

Calculation time per step approximately 25 seconds.

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NEW BOOK ON "SUBVERSIVE" WESTERN RADIO BROADCASTING

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 12, Dec 86 (signed to press 31 Oct 86) pp 34-35

[Article, published under the heading "Assisting the Propagandist," by N. Nikolayev: "Radio Subversion on Order"]

[Text] Henry Kissinger once stated, when he was serving as an assistant to the President of the United States, that a radio broadcasting operation can prove to be a more effective means of applying pressure on many countries than a squadron of B-52 bombers. The 1970's, and particularly the 1980's, have witnessed unchecked, lying, subversive radio propaganda -- a component part of the foreign policy of countries of state monopoly capitalism. A book by V. Yaroshenko entitled "Chernyy' efir" ["Black" Airwaves] discusses the emergence, development, and conduct of subversive imperialist propaganda (V. N. Yaroshenko, "Chernyy' efir: Podryvnaya propaganda v sisteme burzhuaznogo vneshnepoliticheskogo radioveshchaniya" ["Black" Airwaves: Subversive Propaganda in the System of Bourgeois External Political Radio Broadcasting], Moscow, Iskusstvo, 1986, 207 pages, 75 kopecks).

The author persuasively shows that the direction taken in the activities of leading imperialist radio broadcasting centers changed substantially after World War II: anticommunist, anti-Soviet propaganda -- broadcasting aimed at the USSR and the socialist countries -- advanced to the forefront. Standing in second position is neocolonialist, antisocialist broadcasting aimed at discrediting the national liberation movement in the countries of Asia, Africa, and Latin America. Interimperialist broadcasting stands only as high as third place.

The functions of subversive propaganda are performed to one degree or another by official, government, privately-owned, commercial, and religious radio broadcasting stations, as well as so-called "black" broadcast operations --- underground operations to the activities of which the book devotes its main attention.

This latter category includes a vast network of radio broadcast organizations subordinate to the CIA and the intelligence services of the armed forces of the United States and other NATO countries. Many of them are regular, operationally-ready or currently-operating "psychological warfare" subunits.

These radio broadcasting operations do not disclose their actual source of funding, broadcast under purely made-up name designations, and wage destructive anticommunist, antideocratic propaganda. They are intended to operate both in peacetime and in time of war. The author points out, for example, that during World War II there were almost 60 underground, "black" radio broadcasting stations on the air. During attempts to organize a counterrevolutionary putsch in Czechoslovakia (1968), at times there were as many as 35 underground stations broadcasting over that country's airwaves. According to figures obtained abroad, in 1975 there were approximately 50 underground radio stations operating in various countries. Such operations are continuing today, and they are being heavily counted upon. Such a broadcasting station may not even be located on the soil of the country for which the broadcasts are intended. BBC, Radio Liberty, Radio Free Europe, Vatican Radio, and other operations working under direct CIA sponsorship frequently perform the functions of "black" broadcasting operations.

Both strategic and official, as well as tactical, illegal-subversive radio broadcast operations employ many common propaganda techniques and methods. Both count on gaining the trust of their listeners and on exploiting that trust. Considering listener trust to be a mandatory condition for successful operation, propagandists of the "black" airwaves include plausible reports in their broadcasts in the first phase, in order to gain the listener's trust. After they have achieved this, subversive radio broadcasting operations shift to their principal mission: employing disinformation, spreading of rumors and slanderous statements, to create conditions for undermining the authority and prestige of domestic information media, governmental establishments and organizations, discrediting government decisions, and changing the listenership's system of values. And, finally, the third phase involves outright intervention in crisis situations: transmission of instructions, proclaiming of political slogans, announcing candidates for so-called alternative government authority as well as the names of persons to be "dealt with," etc.

The author stresses that the fact that bourgeois theory is counting on conflict-free, "peaceful" penetration of a target country by counterrevolution increases the attention paid by bourgeois ideologues to the first two phases. For example, the endeavor to gain trust at the "strategic level" has been and continues to be a matter of special concern on the part of the BBC. This radio broadcasting organization is scrupulously accurate in reporting known facts or news reports of a secondary nature which are externally unfavorable to Great Britain. In this way it gains the trust of its listeners, so that it can broadcast distorted news information in critical instances which are fundamentally important in an ideological-political respect. Such has been the case during events in Chile, on Cyprus, and in Poland. Such is the case in treatment of Soviet domestic and foreign policy. For example, floods of lies are poured out about the limited Soviet force in the DRA which is rendering internationalist assistance to a friendly people.

Strategic (official) radio broadcasting operations use a plausible fabrication which is difficult to check. Broadcasting operations of a subversive nature, however, may broadcast any lie, even one which may soon be exposed. But it is expedient to broadcast such a lie in order to attain a specific tactical

objective, for it will have accomplished its propaganda mission prior to being exposed as false.

The ultimate aim of subversive propaganda is to spread dissension and chaos in the target country. Disinformation and slander cause discontent and resentment in the target country. The mechanism of forming discontent consists in drumming into the mind of the masses the conviction that their rights have been infringed and that they have been deprived of deserved privileges. Subversive propaganda makes extensive use of private-ownership mentality and selfish interests as motivational stimuli.

The author devotes considerable attention to the tasks facing Soviet propagandists in counteracting bourgeois ideology. The author discusses in detail methods of combating hostile propaganda, countermeasures, neutralization of and putting an end to subversive actions, which vary in relation to the techniques and forms of ideological subversion. He stresses that the main obstacle in the path of hostile propaganda is moral-political unity, political maturity, and a high level of scientific knowledgeability on the part of Soviet civilians and members of the Armed Forces.

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WESTERN AIR INTERCEPT TECHNIQUES DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 12, Dec 86 (signed to press 31 Oct 86) pp 38-39

[Article, published under the heading "Abroad," by Lt Col A. Ivanov: "Means and Methods of Air Intercept"; first paragraph is AVIATSIYA I KOSMONAVTIKA introduction; based on materials published in the foreign press]

[Text] The imperialist machine of militarism and war is continuing to accelerate. Military officials of the United States and other capitalist countries, in addition to placing new arms and equipment in the operational arsenal, are devising new means and methods of their employment. The following article discusses some of these.

According to the regulations and manuals of Western air forces, interception is defined as a mode of encountering an air target at a specified point for the purpose of destroying it. The point of engagement is usually moved out in the direction of the enemy to a distance guaranteeing the security of the defended ground installation. Means of interception include an aircraft and a control facility equipped with acquisition and guidance radar. Two principal intercept modes are differentiated: from a ground-alert status, and from airborne alert or combat air patrol. The latter mode is most frequently employed to shoot down low-flying targets. Tactics depend on the target's altitude, airspeed, heading, detection range, and nature of enemy attack.

Western military specialists consider the following to be the principal phases of an intercept: search, closing, attack, and breakoff. Close-in maneuver combat is not included in this list, which gives reason not to impose rigid requirements on the maneuver characteristics of aircraft tasked with this role. Intercept tactics are not highly diversified. This has made it possible to give missions a standard configuration and to automate the guidance process. The first missile attack is of decisive significance, since if it fails a second pass ends after the target crosses the specified intercept point. Hostile strike aircraft, which represent the greatest threat, are considered the primary interceptor targets, followed by reconnaissance aircraft and specialized command and control and electronic warfare aircraft.

For a long time the standard intercept pattern was a forward-quarter intercept with a subsequent 180 degree turn at a conversion point with pursuit and attack from a rear-hemisphere position [stern conversion]. After aircraft became armed with Sparrow medium-range missiles, it became possible to attack the target from the forward hemisphere with a short forward-quarter approach. This new weapon made it possible to eliminate "extraneous details" from the traditional pattern -- conversion turn and pursuit. Straightening the flight path, however, had little effect on the location of the intercept point, since aircraft speed had increased.

The intended intercept point is rigidly linked to the target detection point. These points are separated by the distance which the target travels in the time required by the interceptor pilot to start his engine, taxi to the active, take off, and climb out. Foreign specialists note that in spite of the transition to new generations of aircraft, this "passive" time has decreased little. At the same time, a tendency for strike elements to fly lower, to obtain concealment against the underlying ground surface, has led to a decrease in target detection range by air defense system ground radars. Interception of a low-flying target short of the defended installation has become a difficult problem even with interceptors placed on airborne alert. This was one of the reasons for the development of radar early-warning aircraft as a component of air defense forces.

The F-106 was a typical U.S. interceptor in the 1960's-1970's, employed in the North American continental air defense system. The F-104, which was deployed in Europe, the "champion" for air mishaps, was considered to be close to the F-106 in performance characteristics. The obsolete F-106 and F-104 interceptors were replaced by the U.S. Air Force and Navy F-15 and F-14 fighters, which are also capable of close-in maneuver combat. The magazine AVIATION WEEK stated that a large combat radius and considerable patrol-zone endurance are among the requirements placed on an interceptor. The F-15, equipped with conformal fuel tanks, better meets these requirements. Another requirement is high target kill probability at long range. The F-14 is superior in this area, as it is capable of firing AIM-54 Phoenix missiles, with a range of up to 160 km. Pursuant to the adopted decision, the F-15 fighter began to perform the air defense role on land and the F-14 fighter -- at sea, providing air cover to carrier strike groups.

In April 1977 the U.S. Air Force 36th Tactical Fighter Wing, consisting of three F-15 squadrons (72 aircraft), was redeployed to Bitburg Air Base in West Germany and was incorporated into NATO's 4th ATAF. Two years later an additional squadron of 24 F-15 aircraft arrived at Soesterberg Air Base (Netherlands). As the magazine INTERNATIONAL DEFENSE REVIEW reported, these 96 F-15 aircraft were to become a reliable mobile weapon in the West European air defense system. They are capable of scrambling to intercept high-speed, low-altitude air targets 5 minutes after the scramble order is received. In the course of carrying out a combat mission, F-15 aircraft are to work in coordination with Hawk antiaircraft missile systems and other ground air defense subunits within the framework of an integrated command and control system. Foreign military specialists consider a shortcoming of the F-15 fighter -- which shows up during execution of an intercept -- to be the decreased air-target detection range when employing airborne radar operating

in look-down mode. E-3A radar early-warning aircraft, which also perform the functions of airborne command post, are supposed to fill in this gap. The pilot of a single-seat F-15, who is excessively work-loaded with his aircraft's numerous onboard systems and controls, badly needs processed information on the adversary provided from far out. The magazine INTERNATIONAL DEFENSE REVIEW substantiates handing over the search functions to another airborne facility as follows: "It is today advisable for detection of air targets to be intercepted and destroyed to be handed over to an aircraft specifically designated to perform this most important task. One should bear in mind that its radar surveillance coverage area is much larger than the search sectors of fighters armed with medium-range missiles, which now need target designation or command information. At present this information can be obtained by a single link -- by radio -- and therefore the 'airborne command post-interceptor' system cannot be considered immune to jamming."

An improved version of the Phoenix missile -- the AIM-54C -- appeared at the beginning of the 1980's. According to the magazine FLIGHT, in the most recent demonstration flight an AIM-54C missile was fired by an F-14 fighter flying at an altitude of 1,100 meters at Mach 1.55. The missile scored a hit on a target drone in the forward quarter, flying at an altitude of 9,100 meters, at a range of 166 km.

In the French Air Force, intercept missions were assigned to the Mirage F-1 fighter after they were armed with the Super-530 air-to-air missile. As was reported by the magazine AIR ET COSMOS, the all-weather Super-530 missile is designed to shoot down high-speed long-range strike aircraft. In an air demonstration two Mirage F-1 aircraft intercepted and simulated a kill on an "enemy" played by a Mirage F-4 bomber. According to the pilot's report, the fighter's radar detected the target at a range of 46 km. After closing to 37 km, the bomber executed a defensive maneuver which prevented the interceptor from locking on. The target was locked onto automatic tracking at a range of 22 km, and this was followed almost immediately by the "command" authorizing missile launch (range 18 km).

Thus in the U.S. and French air forces, intercept missions at the present time are not assigned to specialized aircraft but to fighters armed with medium-range air-to-air weapons. Britain's Royal Air Force proceeded somewhat differently, adopting the Tornado F-2 interceptor, based on the Tornado fighter-bomber. This aircraft is equipped with an airborne intercept radar linked in with an IFF interrogator, a threat and warning receiver, a replaceable weapon control system and electronic cockpit panel display. The weapons package includes four Sky Flash medium-range missiles. Several bomber functions have also been stripped, which has made it possible to increase internal fuel supply by 10 percent.

The Tornado F-2 is heavier than the F-1 and F-15 fighters, has greater wing loading and is less maneuverable. This is considered a hindrance to the conduct of close-in air-to-air combat, in spite of a 15 percent increase in thrust-to-weight ratio and increased turning speed provided by the improved thrust of the new MK-104 engine. The British interceptor is a two-seater, with responsibilities divided between pilot and weapons officer (navigator).

The work procedures performed by the crew of a Tornado F-2 interceptor and the sequence of crew work procedures can be seen from a description of a combat sortie broken down into principal phases. In the search phase the aircrew accomplishes detection of air targets independently or receives target designation from a radar early warning aircraft. When working in a practice area search in range and azimuth is the principal information-secur ing mode. Detected but unidentified targets appear on the radar display as vertical hash marks. After the target has been identified by IFF gear, a horizontal line is superimposed on the vertical hash marks, range to the target is indicated on a vertical scale and target azimuth on a horizontal scale at the edge of the radar display. In this mode the navigator, on the basis of target distribution and range, can strobe one of the target returns and switch to automatic tracking. The interceptor's Fox Hopter radar is capable of detecting an air target with a radar cross section of approximately 3 square meters at a maximum range of 185 km.

Just prior to commencement of the closing phase, the navigator chooses an intercept configuration, bringing onto the screen a display in search mode indicating closing speed and azimuth. Each identified target is indicated by three horizontal hash marks (triplet). If the target is approaching, its symbol is positioned below the line where the interceptor's mark is positioned, and if it is moving away -- above this line. By pressing one of the buttons under the radar display, the navigator switches to a northward-pointing plan position display. Data comes in from external information sources via a scrambled communications link. Sequential analysis of differing data on the adversary enables the navigator to make an intercept decision. In a complex situation, however, characterized by the presence of several targets, decision-making becomes much more difficult.

The attack phase in a forward-quarter intercept usually merges with the closing phase. The navigator enters target data into the attack system computer memory, gives the "command" to ready the Sky Flash missile, and monitors tracking of the locked-on target. The display is transferred to the pilot's head-up display. In attack mode the interceptor appears in the center of the screen. It is encircled by a small ring with "wings," which functions as an artificial horizon. The aiming point is indicated with a square symbol inside a circle. A larger-diameter circle indicates the allowable error in pointing the aircraft, limited by the maximum swivel of the Sky Flash missile's seeker, which turns to the presumed target intercept point. The target's course and bearing to the target are displayed above the larger circle. Maximum and minimum missile launch range are indicated by a luminous column on a vertical line to the right, with a moving triangular index mark indicating present range to target.

While the navigator operates the weapon system, the pilot flies the aircraft, correcting aiming errors. If the enemy suddenly appears at close range, all systems simultaneously (after a button has been pressed on the throttle) switch to close-in combat. The onboard radar begins scanning vertically within the head-up display's 20 degree sector and locks onto the closest target, after which data are fed into the onboard computer in preparation to fire short-range missiles or cannon.

These are the principal means and modes of air target intercept employed by the air defense aircraft of the leading capitalist countries.

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PHOBOS LANDER PROBE TO INVESTIGATE MARTIAN MOON

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 12, Dec 86 (signed to press 31 Oct 86) pp 42-43

[Article, published under the heading "Responding to Readers' Questions," by V. Balebanov, deputy director, USSR Academy of Sciences Institute for Space Research: "Project 'Phobos"'; final article of three-part series, see AVIATSIYA I KOSMONAVTIKA, No 9, 11]

[Text] TV imaging of Phobos will be performed by cameras in three spectral bands. This will make it possible to distinguish surface details with linear dimensions of more than 6 cm. Spectrometric analysis of the photographed areas will be performed simultaneously in 14 spectral bands. The videospectrometric package has the capability to store 1,100 complete frames, for subsequent transmission to Earth by radio link. By changing the direction of the instruments' field of view with a swiveling mirror, it will be possible to perform both plan-view and panoramic imaging and to obtain images of Phobos against a star background, which is important for solving mission navigation problems.

The Phobos images and spectrograms transmitted to Earth will make it possible to prepare topographic, structural-morphological and other maps, as well as to tie in the coordinates for remote sensing performed by other instruments.

Topography, surface structure, and soil characteristics will be studied by the radio-frequency remote sensing method as the probe drifts over Phobos close to the Martian moon's surface.

After the space vehicle approaches Phobos to a distance of several tens of meters, it will release a landing probe -- a long-lived self-contained station which will slowly "fall" to the surface. The relative speed of closing between the station and Phobos will amount to several meters per second. After touching down, the probe will secure itself with the aid of a rod, which will be driven into the ground with an explosive charge. The lander will then fully deploy, with solar panels and scientific equipment sensors aimed toward the Sun.

The principal task of the long-lived self-contained station is to conduct those experiments on the surface of Phobos which require protracted

measurements. These include, for example, investigation of the parameters of the Martian moon's motion in orbit. Since this Martian moon has a small (in comparison with space vehicles) "surface-mass" ratio, the effect of nongravitational forces on its motion is negligibly small. The irregular nature of distribution of masses within Mars also exerts very little effect on the orbit of Phobos. Landing a probe on the Phobian surface will make it possible to conduct unique investigations of the mechanics of the moon's motion and to refine and detail a number of quantities.

Radio signals will be picked up by 70-meter antennas at Yevpatoriya and Ussuriysk and by a 64-meter antenna near Moscow. Radio telescopes located in Western Europe, North and South America, Southern Africa and Australia are also to be used.

Distance measurements will provide the primary information for experiments in celestial mechanics. Radio signals from the orbital vehicle will be received simultaneously with signals from the self-contained lander vehicle. This is essential in order to figure in the effect of environment on signal propagation when measuring distance. Study of Phobian librations also requires an extended period of time; signals from two transmitters located at different points on the Phobian surface will be used for this purpose (each of the space vehicles is to release a long-lived self-contained lander on its approach to Phobos).

And, finally, an additional extended-duration experiment -- recording by seismometer of noise generated by the Martian gravitational field and thermal expansion of Phobian rocks as the moon passes from day to night and caused by the impact of meteorites.

Another group of experiments includes investigation of the element composition of the surface layer, its structure, its physical and mechanical characteristics. The bulk of the information on element composition will be obtained from the orbital vehicle by laser remote sensing. Direct measurements by the lander station are important for calibration purposes and for facilitating interpretation of data obtained by remote sensing.

For this purpose the lander vehicle will carry devices to measure accelerations during impact against the Phobian surface, an X-ray fluorescent spectrometer to determine the chemical composition of the surface soil layer, a penetrometer to investigate the soil's physical and mechanical properties, and a TV system.

An additional lander probe will be able to move along the surface of Phobos. After landing and coming to rest, it is deployed into working configuration with the aid of "whiskers." It then performs scientific measurements. Information is transmitted by radio link to the Earth. A work cycle ends with the probe jumping a distance of up to 20 meters, propelled by a pushing device. After coming to rest, it is ready to perform another work cycle. Up to 10 such jumps will be made. At the same time investigations will be made of the probe's load-supporting capability as well as soil cohesion, compressibility, and internal friction.

Схема передвижения зонда

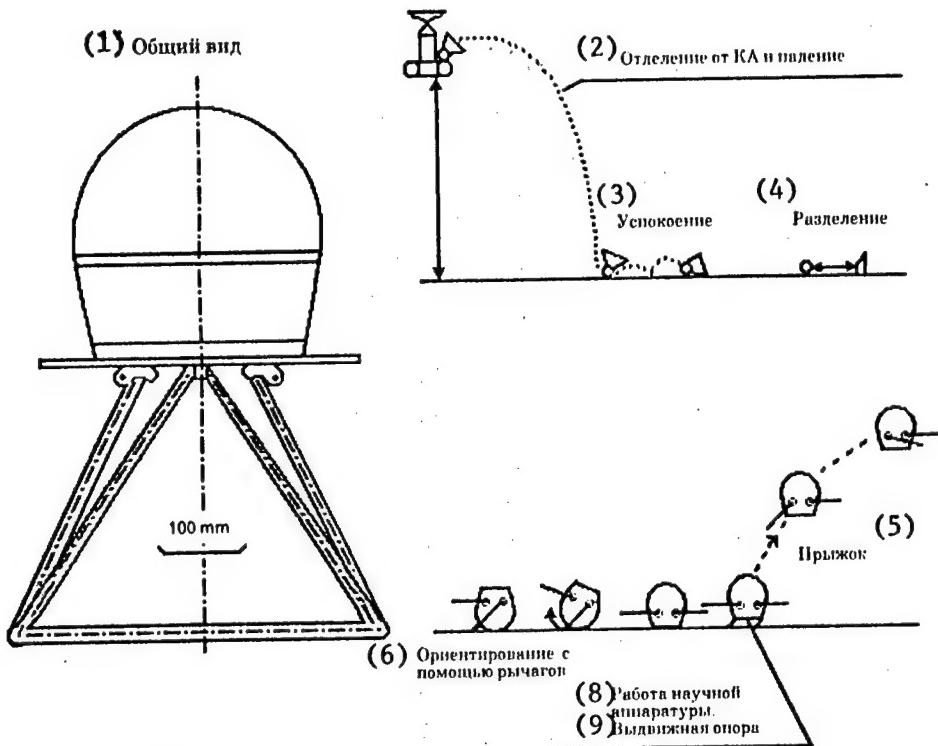


Diagram of probe locomotion

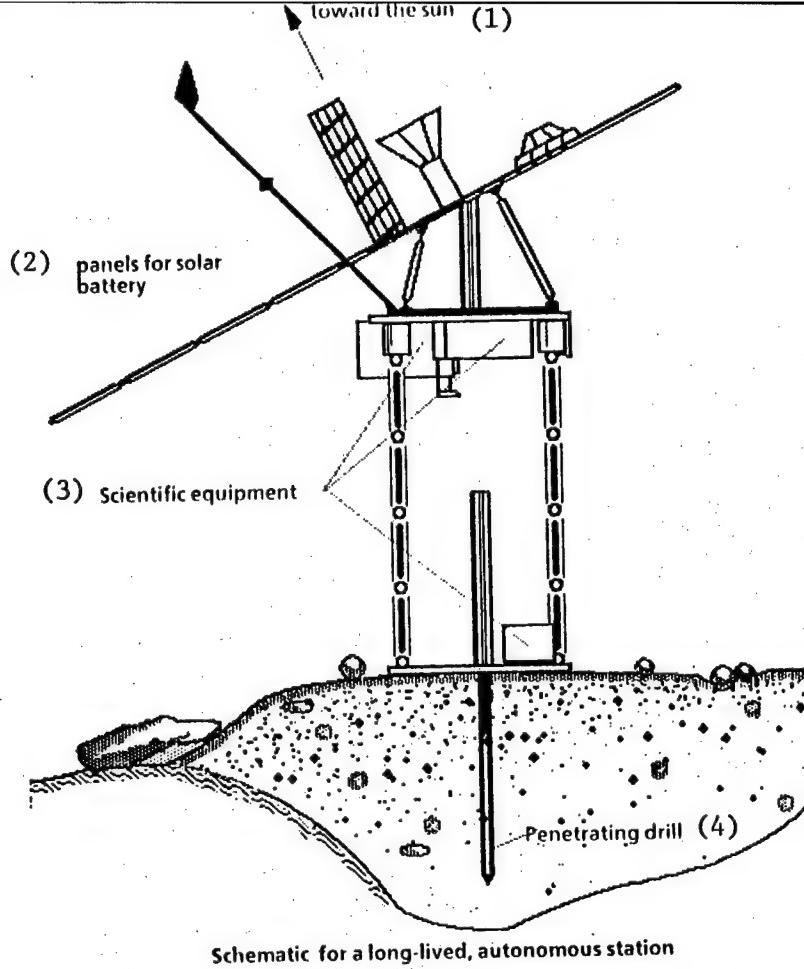
Key: 1. General view; 2. Separation from space vehicle and descent; 3. Coming to rest; 4. Separation; 5. Jump; 6. Directional orientation with the aid of lever arms; 7. Extensible support; 8. Scientific equipment in operation

Project "Phobos" also incorporates an extensive program of solar investigations. Scientist interest is due not only to the fact that it is the closest main-sequence star to us. It represents a vast natural laboratory for plasma investigations.

Investigations of the Sun from beyond the Earth's atmosphere have been conducted since the launching of the first space vehicles. Until recently, however, such studies were conducted for the most part from orbit by satellites. The time has now come to study the Sun simultaneously from several points. Project "Phobos" offers certain opportunities in this regard.

Solar observations simultaneously from a space vehicle, from the Earth, and from Earth-orbit satellites offer a unique opportunity to reconstruct a three-dimensional (stereoscopic) structure of the chromosphere and corona.

It is planned to conduct investigations of the Sun's electromagnetic emissions across a broad range of frequencies in Project "Phobos" -- from soft ultraviolet to hard gamma radiation. These investigations will be conducted with the aid of a telescope-coronograph, the sensor package of which contains three optical channels. Each contains focusing optics, spectral filters, and electronics.



Schematic for a long-lived, autonomous station

Diagram of long-lived self-contained lander station

Key: 1. Toward the Sun; 2. Solar panels; 3. Scientific instrumentation; 4. Anchoring rod

Plans call for spectrometric investigations of the energy, mass, and charge composition of the solar wind. For this purpose the space vehicle will carry a special highly-sensitive instrument which will be able to amass data over an extended period of time. Subsequently this data, following analysis by an onboard computer, will be transmitted to Earth by telemetry data link.

A spectrometer will be used to study the distributions of such principal solar-wind constituents as protons and alpha particles. It will measure flux density, total velocity, temperature and temperature anisotropy (nonuniformity in different directions).

Tracking of solar activity and recording of a signal caused by X-ray emission from a solar flare will be handled by a special monitoring instrument. Analysis of the data obtained from the solar-package instrumentation will provide information on possible precursors of solar flares. Today particular attention is being devoted to the study of so-called nuclear gamma lines.

In contrast to previous investigations, this time recording of gamma bursts will be performed approximately once every 24 hours, which will make it possible to investigate the periodicity and precise time structure both of solar and cosmic gamma bursts.

We should note that gamma bursts were first detected as recently as the beginning of the 1970's. The history of their discovery is as follows. Soon after nuclear testing in the atmosphere was banned, the United States set up a compliance monitoring operation using Vela satellites. As we know, a nuclear explosion is accompanied by a massive pulse of gamma radiation. Detectors carried by monitoring satellites recorded bursts of gamma radiation! Soon, however, it was ascertained that they originated in space. What was astounding was their intensity, which sometimes was thousands of times that of the most powerful known stationary sources. And the duration of radiation bursts ran tens of seconds.

Only about 80 bursts were recorded in the first eight years of observations employing satellites and interplanetary probes. And then 150 gamma bursts were recorded in the "Konus" [Cone] experiment, conducted by the Venera 11 and Venera 12 probes. Bursts were recorded simultaneously by several U.S. and West European space vehicles. But the sensitivity of the instruments used in the "Konus" experiment was 30 times that of any other instrumentation being used. A combined analysis of the results of all observations made it possible to ensure accuracy of determination of the coordinates of the emission sources down to fractions of a minute of arc. The most amazing thing was the fact that there were no bright stars at these coordinates.

The high sensitivity of the instrumentation and excellent spectral resolution enabled Soviet scientists to reach a tentative conclusion on the nature of the sources of the cosmic gamma bursts: they are most likely neutron stars with extremely strong magnetic fields.

One additional interesting experiment connected with study of the Sun aims at investigation of the Sun's internal structure and dynamics. This experiment is based on extended-duration, continuous measurement of intensity of solar radiation, with a high degree of accuracy, within narrow spectral bands. The experiment instrumentation includes three solar photometers with interference filters and a Sun position sensor. Silicon diodes are used as radiation detectors.

It is planned to conduct observations of cosmic gamma bursts and to carry out the "solar program" in cooperation with a West European extraecliptic probe. The long Phobos vehicle-probe base, approximately one astronomical unit, and a third "point" of observation -- the Soviet Granat [Garnet] astronomical satellite -- will provide an accuracy of localization of gamma burst sources in the order of 10 seconds of arc.

Establishments, scientists and specialists from Bulgaria, Hungary, the German Democratic Republic, Poland, Czechoslovakia, Austria, France, the Federal

Republic of Germany, Switzerland, Sweden, and the European Space Agency are taking part, together with teh Soviet Union, in preparing the scientific program to be conducted by Project "Phobos," in designing and building the instrumentation package, and in conducting experiments.

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SOVIET-BLOC EARTH REMOTE SENSING ACCOMPLISHMENTS

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 12, Dec 86 (signed to press 31 Oct 86) pp 44-45

[Article, published under the heading "Space Program in the Socialist Countries," by V. Olshevskiy: "The Earth From 'Interkosmos' Orbits"]

[Text] The Twelfth Conference of the Socialist Countries' Working Group on Remote Earth Sensing of the Interkosmos Program was held in Tallinn from 12 to 18 May 1986, attended by scientists and specialists from Bulgaria, Hungary, the GDR, Cuba, Mongolia, Poland, Romania, the USSR, and Czechoslovakia.

Formal steps for a cooperative effort in this area were taken in 1974 with the establishment of an official body within the framework of Interkosmos -- the Working Group of the Socialist Countries on Earth Remote Sensing with Aerospace Vehicles (RGDZ). The first international orbit to study the Earth environment from space was flown by the Soyuz 22 spacecraft in 1976. Cosmonauts V. Bykovskiy and V. Aksenov, using an MKF-6 six-channel camera, developed jointly by Soviet and East German specialists, took part in the Raduga [Rainbow] experiment to develop methods and means of studying from orbit the geologic-geographic characteristics of the Earth's surface.

Processing, deciphering and interpretation of multiple frequency-band images of the Earth's surface obtained by the MKF-6 camera system confirmed the correctness of the direction of investigation and the hardware embodiment of scientific thought. The orbital photographic camera, built by Karl Zeiss Jena, became a regularly-utilized system on the Salyut 6 and Salyut 7 permanent orbital space stations. Progress supply craft provided the crews with photographic film. The effectiveness of the decisions which had been made was fully confirmed by the international manned missions which commenced in 1978. The scientific program for all international crews which docked to the Salyut 6 station included visual observations and imaging of the Earth's land surface and the World Ocean with manual, semiautomatic, and fixed-mount instruments and systems on board the Salyut-Soyuz manned complex.

This period was filled with experiments and routine operation of already-proven systems investigating the Earth from orbit. Nevertheless the most interesting results were obtained during the next five years (from 1981); development of orbital methods and means of studying the Earth's atmosphere,

lithosphere, hydrosphere, and biosphere was determined for the next five-year period and the years immediately following.

This is why, before discussing new programs and projects, the conference, under the chairmanship of Doctor of Technical Sciences N. Armand, leader of the Soviet delegation, examined the results of RGDZ activities in the area of developing promising methods and means of obtaining, processing, and interpreting aerospace data on Earth resources and the environment during the preceding five-year period.

The Fragment experiment was conducted by the Meteor-Priroda satellite, which made it possible to reach basic engineering solutions pertaining to a high spacial-resolution multispectral scanning system. Information was passed on to appropriate organizations in the Soviet Union and the other CEMA member countries for use in their economies. This same satellite carried out the Bulgariya-1300 combined Soviet-Bulgarian project, using SMP-32 (multiple-frequency spectrometer, Bulgaria), RM-1 and RM-2 (microwave radiometric systems, Bulgaria and the USSR), and MSU-S (medium-resolution scanner, USSR) equipment.

The specialized Interkosmos 21 satellite, launched for the purpose of devising methods of combined study of the World Ocean and the Earth's land surface, as well as systems of automatic data collection by ground stations, completed its investigations. This satellite carried the following scientific instrumentation: an MKS multichannel spectrometer (GDR and USSR), an R-225 microwave radiometer (USSR), and an SGR magnetometer (Romania and USSR).

At this same time the MKS-M - MKF-6M spectrophotographic system and the Spektr-15 spectrophotometer (Bulgaria) were undergoing final development on board the Salyut 7 orbital space station. And on board the Salyut 7 - Soyuz T - Progress orbital complex, the Biosfera-B200 experiment was conducted with a Praktika B-200 (GRD, USSR) miniature camera.

Specialists from Bulgaria, the GDR, the USSR, and Czechoslovakia designed and built a number of instruments to investigate natural features from aircraft serving as flying laboratories.

In addition to the success achieved in developing hardware, we should particularly note the Chernoye More [Black Sea] and Gyunesh [Sun] (USSR), Spektr-MON (Mongolia), Sakharnyy Trostnik [Sugarcane] (Cuba), Telefoto (Poland), and Kursk (USSR) combined aerospace experiments, which made it possible to obtain confirmation of the correctness of the methodological approach to study of natural objects from space taking into account the effect of the atmosphere. The possibility of conducting such scientifically highly complex experiments appeared in connection with the adoption of a new organizational form of conducting joint international specific-purpose combined projects.

Programs for four large-scale international projects have now been approved and are being implemented. One of them, called "Priroda" [Nature], is a technical project. It is helping accomplish further development of methods of and hardware for Earth remote sensing. Three others are Earth resources

projects. Their aims are clear from their names: Study of Geologic Structures by Remote-Sensing Methods; Study of the Dynamics of Geosystems by Remote-Sensing Methods; Study of the World Ocean Taking Into Account the Effect of the Atmosphere.

Considerable success has also been achieved by member-nation specialists in devising methods and means of processing aerospace data. A large contribution in this area of joint activity has been made by GDR engineers and scientists, who developed the KTS-A6470 video image digital processing system, and by Soviet specialists, who developed SVIT video information interactive processing equipment. Regional aerospace data processing centers are currently being set up by a number of organizations of the USSR Academy of Sciences and other agencies, on the basis of this equipment, as well as instruments developed by scientific research teams of other countries participating in the Interkosmos Program.

Mobile satellite observation stations have been set up in field test areas in Bulgaria, Hungary, the GDR, and the USSR to conduct measurements synchronous with aerospace remote sensing.

In analyzing RGDZ achievements, we must also note that 119 scientific articles and papers, 16 reports, 8 books and monographs, an atlas of examples of thematic processing of imagery obtained from orbit, as well as a multilanguage explanatory dictionary on remote sensing were published in the period 1981-1985.

Participants at the Tallinn meeting noted that in all RGDZ participating countries there has been a rise in the professional level of teams working on problems of obtaining and using aerospace data. New scientific research establishments or subdivisions of already existing organizations are being formed to resolve these problems.

The conference approved measures aimed at improving exchange of information among participating countries, at stepping up monitoring of the conduct of project and experiment activities, and at strengthening ties with economic branch and sector organizations for adopting the results of joint scientific research activities. Participants visited the Exhibit of Achievements of the Economy of the Estonian SSR, where they viewed an interesting exhibit entitled "Earth Remote Sensing Equipment and Technology." Also on exhibit was equipment developed by RGDZ member countries, as well as scientific research results, with examples of their utilization in the economies of the CEMA member nations.

A scientific seminar was held as part of the conference program, dealing with problems of development of applied-physics and mathematical research in the area of Earth remote sensing and matters pertaining to investigation of the characteristics of the land surface, the World Ocean and the atmosphere in the

optical and microwave bands from Meteor-Priroda satellites and orbital space stations. The next seminar, on the topic "Application of Earth Remote Sensing Data for the Benefit of Agriculture," will be held at the Thirteenth Conference of RGDZ, to be held in 1987 in Bucharest.

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